

Job Description

Position: Other Specialized Support

Examples of Required Skills:

1. Knowledge of RCRA requirements (40 CFR 260-272, TN Rule 1200-1-11) and DOT regulations (49 CFR).

Required Education:

1. Associate degree in a technical field pertinent to hazardous waste management operations, or equivalent experience and/or specialized training.

Examples of Job Duties:

1. Assists with classification of wastes.
2. Assists, as necessary, with shipment of hazardous wastes.
3. Assists with providing information for generators on chemical waste disposal problems.
4. Assists field operations in resolving classification questions.

Job Description

Position: Laborer/Truck Driver

Examples of Required Skills:

Physical ability to perform manual labor and familiarity with general chemical hazards.

Required Education:

High school education or equivalent work experience.

Examples of Job Duties:

Performs pickup and transport of hazardous and/or mixed wastes to storage units under WO supervision.

Job Description

Position: Forklift Operators

Examples of Required Skills:

Ability to operate heavy machinery and familiarity with general chemical hazards.

Required Education:

High school education or equivalent work experience.

Examples of Job Duties:

Operate forklift to move containers of waste.

APPENDIX 4-2 TRAINING CONTENT

General Employee Training

This course is provided to new employees and repeated for all employees on a biennial basis. It provides information on emergency alarms, emergency communications, basic spill or emergency response, basic radiation safety, and employee responsibilities.

Radiation Worker

This course instructs employees on how to work safely in radiological conditions while keeping exposures ALARA. Topics covered include sources and types of radiation, biological effects of ionizing radiation, dosimetry, ALARA, emergency preparedness, and protective clothing.

Hazardous Waste Operations Training

The curriculum involves an overview of the regulations and requirements of RCRA and emergency response and equipment. Topics are specific to job/tasks being performed and may include all or part of the following: regulatory overview; treatment, storage, disposal requirements; hazardous waste characterization; low-level waste; accumulation area requirements/forms; land disposal restrictions; emergency procedures, communication or alarm systems, responses to fires or explosions, response to hazardous material spills, and shutdown of operations.

24-Hour HAZWOPER Training

This training program describes the fundamentals of industrial hygiene so that employees can take part in their own safety and health protection. Names and telephone numbers of environmental safety and health support groups that can provide assistance are provided. The following topics are covered: overview of regulations, types of hazards, hazard control measures, toxicology, respiratory protection, personal protective equipment, monitoring, and emergency preparedness and response.

HAZWOPER Training for Managers/Supervisors

24-Hour HAZWOPER Training is a prerequisite for this course. This course provides additional information on selection of personal protective clothing and equipment, emergency response and community right-to-know, and legal aspects of supervising waste operations.

HAZWOPER Annual Refresher

This retraining course provides a basic review of health and safety hazards and describes methods to protect personnel from such hazards. The course includes health and physical hazards posed by chemicals, radiation, and confined spaces. Personal protective clothing and equipment, site characterization, site control, decontamination, and spill response are also covered. Any regulatory changes issued after the first course are highlighted.

Spill Response: Operations

This course provides basic training to employees who will encounter spills. It instructs them on how to respond initially to spills of hazardous materials and/or waste (awareness level) and how to properly contain spilled materials. Topics include identification of hazardous materials, chemistry and toxicology of hazardous materials, and basic emergency response.

Spill Response: Technician

This course trains employees on how to respond to and clean up spills of hazardous materials and/or wastes. Topics include incident analysis, emergency response planning, identification of hazardous materials, chemistry and toxicology of hazardous materials, hazard and risk assessment, incident management, personal protective equipment, and decontamination.

Spill Response: Specialist

This course provides additional training to spill response technicians to enable them to lead spill response teams and to respond to spills of extremely hazardous materials.

On-the-Job Operations

The on-the-job operations training focuses on specific on-the-job tasks associated with each job position. This training is frequently based on SOPs for a given activity or operation. Training includes, but is not limited to

- equipment usage and safety (forklifts, drum handling, vehicle loading and unloading, etc.);
- transportation safety (vehicle inspection, road testing, etc.); and
- hazardous waste operations (waste identification, handling, storage, packaging, transportation, facility operating procedures and inspections, and manifesting).

ATTACHMENT 5 CONTINGENCY PLAN

PURPOSE

The purpose of this contingency plan is to minimize hazards to human health or the environment from fires, explosions, or any unplanned sudden or nonsudden release of hazardous waste or hazardous waste constituents to air, soil, or surface water.

This contingency plan will be continually reviewed and revised if any of the following occur: (1) the facility's Resource Conservation and Recovery Act (RCRA) Permit is revised, (2) the plan is inadequate in an emergency, (3) the procedures herein can be improved, (4) the facility's operations change in a way that alters the plan, (5) the emergency coordinator information changes, or (6) the emergency equipment summary for the hazardous waste facilities/units changes.

SCOPE

The contingency plan describes the actions that facility personnel will take to comply with and implement the plan, including emergency procedures. This contingency plan describes all the hazardous and mixed waste management units at the Oak Ridge National Laboratory (ORNL) and the Transuranic (TRU)/Alpha Low-Level Waste (LLW) Remediation facility, which is referred to as the TRU Waste Processing Facility (WPF).

This contingency plan is prepared to satisfy the RCRA requirements in 40 Code of Federal Regulations (CFR) Part 264 Subpart D and Part 265 Subpart D and TN Rule 1200-1-11-.06(4) and 1200-1-11-.05(4), which require that all hazardous waste facilities develop a contingency plan designed to minimize hazards to human health or the environment from fires, explosions, or any unplanned sudden or nonsudden release of hazardous waste or hazardous waste constituents to air, soil, or surface water. This document ensures that units used to store hazardous wastes have established the necessary planned procedures to follow during an emergency situation. This plan addresses emergency response actions for the RCRA treatment, storage, and disposal (TSD) units at ORNL and the WPF (see list of units in Appendix 5-1). The 90-day storage areas at ORNL have a separate contingency plan for their waste operations and incorporate this RCRA contingency plan as appropriate. This contingency plan does not include specific guidance for compliance with the requirements of 40 CFR 112, Oil Pollution Prevention, or for compliance with 49 CFR 130, Oil Spill Prevention and Response Plans, since these requirements are published in the ORNL Spill Prevention, Control, and Countermeasures (SPCC) Plan.

The ORNL Emergency Management System is documented in the *Oak Ridge National Laboratory Emergency Plan*, effective February 1, 2006, herein the "*site emergency plan*."¹ ORNL uses a "Lead" and "Event" contractor concept of operations for emergency response. UT-Battelle, the managing and operating contractor (M&O Contractor) for ORNL, is the Lead contractor. Bechtel Jacobs Company, LLC, the managing and integrating contractor (M&I Contractor) responsible for the Environmental Management Program at ORNL, is an Event contractor. Foster Wheeler Environmental Corp (FWENC), the permittee and co-operator for the WPF, is an Event contractor. Successful response to an emergency situation requires strict adherence to the *site emergency plan* and site procedures and coordination between the Lead and Event contractor(s).

UT-Battelle, as Lead contractor, is responsible for overall emergency response and for staffing the

¹ U.S. Department of Energy Oak Ridge Reservation Emergency Plan Oak Ridge National Laboratory, ORR 150.B0 Volume 2, January 20, 2006.

majority of the Emergency Response Organization (ERO) positions. The Lead contractor provides the 24/7 notification point, the Laboratory Shift Supervisor (LSS). The Lead contractor develops and implements the *site emergency plan*. The Lead contractor provides funding and maintains response resources for ORNL based on the hazards identified in hazard surveys and assessments. UT-Battelle maintains overall site-wide responsibility for emergency response and will retain the basic equipment, facilities, and staff to perform this activity. UT-Battelle will respond to fire and medical emergencies at all ORNL facilities regardless of operating contractor.

Bechtel Jacobs Company LLC and FWENC are responsible for the emergency programs within their respective operated facilities. These facilities' emergency programs are integrated with the ORNL Emergency Management Program. The Event contractor immediately notifies UT-Battelle by contacting the LSS Office of any events that may cause harm to site personnel or property. During an event at the Event contractor's facility, an Event contractor representative is activated and reports to the Emergency Operations Center (EOC) whether the event is classified or not. The Event contractor supports the incident command and site response with event classification, worker protection, mitigation, and technical support to the EOC. The Lead contractor's Shift Emergency Squad will provide only immediate mitigation or containment of a release to the Event contractor. Follow-on clean up and recovery will be the sole responsibility of the particular Event contractor.

Any emergency notification to the Tennessee Emergency Management Agency (TEMA) will be made by the site LSS in accordance with the *site emergency plan* and the site contingency plan. In the event of a release from an Event contractor facility, the LSS will make the immediate notification, which includes releases of Comprehensive Emergency Response and Compensation Liability Act (CERCLA) reportable quantities (RQs), National Response Center (NRC) notification, Environmental Protection Agency (EPA), and the Local Emergency Planning Committees (LEPCs).

The Event contractor is responsible for any subsequent follow-up reports or updates resulting from emergency events at their facilities.

1. GENERAL INFORMATION

1.a. Description of Site and Environs

ORNL, located 40 km (25 miles) west of Knoxville, Tennessee, began operating in 1943. Initially part of the Manhattan Project, post-World War II research has continued in the area of atomic energy and in other nuclear products applications. The WPF began operations in 2002, to characterize, treat and repackage, as necessary, ORNL waste for off-site disposal. The facility (EPA ID No. TN1 89 009 0003), owned and operated by the U.S. Department of Energy (DOE) and FWENC, is part of the DOE Oak Ridge Reservation (ORR). Other major facilities located within the boundaries of the reservation include the East Tennessee Technology Park (ETTP) (formerly known as the K-25 Site) and the Y-12 National Security Complex.

White Oak Creek (WOC) drains the Bethel Valley portion of the ORNL complex. The creek flows south of ORNL through Bethel Valley, passes through a gap in Haw Ridge to the southwest, crosses Melton Valley, and enters White Oak Lake (WOL) approximately 1.24 km (1 mile) south of ORNL. Additional ORNL experimental facilities are located south of the main ORNL complex in Melton Valley. These additional facilities include two former demonstration reactors, the High Flux Isotope Reactor (HFIR), two bare reactors (reactors operated without shielding), and process plants. Melton Valley is drained by Melton Branch, a tributary of WOC, and the combined flow then drains to WOL. Water released from WOL is controlled by White Oak Dam. These waters enter the Clinch River at mile 20.8, which is below Melton Hill Dam. The Clinch River flows into the Tennessee Valley Authority (TVA) Watts Bar Lake. The Clinch River is a navigable waterway for barge traffic and serves as a water supply for several facilities and communities, the closest of which are the ETTP and the city of Kingston. The Clinch River is also used for commercial fishing, sport fishing, and

other recreational purposes. WOL is on the ORR and is not used for any recreation purposes.

1.b. General Facility Information

The facility identification number for ORNL is TN1 89 009 0003.

The facility addresses are

Oak Ridge National Laboratory
Bethel Valley Road
Post Office Box 2008
Oak Ridge, Tennessee 37831-6269

TRU Waste Processing Facility (WPF)
100 WIPP Road
Lenoir City, TN 37771

The owner/operator's addresses are

U.S. DOE/Oak Ridge National Laboratory
Post Office Box 2001
Oak Ridge, Tennessee 37831-8620

TRU Waste Processing Facility (WPF)
100 WIPP Road
Lenoir City, TN 37771

The overall layout of ORNL and the location of the RCRA units are shown in Map 1. Appendix 5-1 provides a list of RCRA TSDs at ORNL and describes each unit's operations and design. Locations of entrances, roads inside the facility, main storage buildings for emergency equipment, and possible evacuation routes are also provided in Map 1. The LSS will determine and direct all personnel to the appropriate evacuation routes.

The overall layout of the WPF and the locations of the RCRA units are shown on Map 1. Appendix 5-1 provides a list of the WPF units and describes each unit's operations. Map 1 shows locations of entrances, roads, buildings and evacuation routes associated with the WPF.

1.c. ORNL Emergency Management System

The ORNL Emergency Management System follows a three-tier approach. These three-tiers are on-scene response (i.e., emergency squad, incident command), site-level response, and off-site level response (i.e., ORO EOC, DOE-Headquarters, and state and local governments).

Event Scene Response

Incident Command is operated under the National Incident Management System. The Incident Commander (IC) applies the necessary resources (i.e., hazardous material [HAZMAT], security, emergency medical, health and safety, and facility/operations managers, etc.) to mitigate the event at the scene. If the event is security related, the IC is provided by Wackenhut Services, Incorporated. If the event is non-security related, the IC is provided by the ORNL Fire Department.

Site Level Response

The site response is initially directed by the LSS. When an emergency situation occurs at ORNL, personnel notify the LSS. The LSS is the 24-hour point of contact. The LSS implements the *site emergency plan* and procedures through the activation of the ERO. The LSS performs the initial categorization of the incident and determines the proper emergency class in accordance with the Laboratory's Emergency Action Levels. The LSS becomes the Laboratory Emergency Director (LED) when the event has been categorized as an Operational Emergency and remains in this role until relieved by the ORNL Crisis Manager as part of the ORNL EOC.

If the event is categorized as an Operational Emergency, the EOC is activated by the LED. Once the EOC is operational, the on-site and off-site activities and responses transition to the EOC. The EOC activities include:

- Coordination with on-site response forces
- Timely update to the site workforce
- Developing potential on-site and off-site consequences and protective actions and protective action recommendations
- Coordination with the state, local governments, and federal government agencies (DOE-HQ, Environmental Protection Agency, Federal Bureau of Investigation, etc.).

Off-Site Response

Response outside of the Laboratory Emergency Response Boundary is the domain of the DOE Oak Ridge Operations Emergency Operations Center (DOE EOC), DOE Headquarters, and state and local governments. This response is documented in their respective emergency plans and procedures.

2. EMERGENCY RESPONSE ORGANIZATION

Emergency management requires an organization with specific emergency responsibilities that are separate from those of the normal operating structure. ORNL emergency management personnel are able to make effective transition from a normal operations organization to an ERO. The ERO establishes control at the event scene and integrates the on-site and off-site response services as well as communications with off-site governmental oversight agencies.

The LSS on duty is the Emergency Coordinator as required by 40 CFR 264.55. The LSS on duty has the responsibility and authority to commit the resources needed to carry out the contingency plan. Specific responsibilities of the LSS are described below. However, the main responsibility of the LSS is to initiate and coordinate emergency response efforts. The LSS office, located in the Laboratory Emergency Response Center (LERC), Building 4512, is manned 24 hours/day, 7 days/week. The LSS may be contacted by dialing (865) 574-6606. The LERC is centrally located within the ORNL complex so that the LSS on duty can reach any unit in a short time. Off-duty LSS personnel do not have primary responsibility to respond to emergencies; therefore, home contact should not be necessary. The mailing address for the emergency coordinators is:

Oak Ridge National Laboratory
P.O. Box 2008
Oak Ridge, Tennessee 37831-6343

Laboratory Emergency Director (LED) is a generic term for the *one* person in charge of ORNL emergency response at a given time. During most emergencies (and the initial stages of all emergencies), the LSS is the LED. For serious events in which the Oak Ridge Emergency Operations Center (OREOC) is activated, the Crisis Manager, who heads the OREOC, becomes the LED when the OREOC is operationally ready. In this contingency plan, the term, *Emergency Director*, always refers to the person in charge of emergency response at a given time, whether it is the LSS or the Crisis Manager.

The LED will activate both ORNL-wide and local emergency squads as necessary when an emergency occurs. The Shift Emergency Squad, comprised of operating, technical, and support personnel, is a seven-member group consisting of an industrial hygiene technician, health physics technician, steam plant operator, shift electrician, chemical operator, chemical foreman, and substation operator. All members are available around the clock to the LED to assist in the resolution of an abnormal event occurring in or around the Laboratory.

The Shift Emergency Squad responds to all emergencies and performs duties, as directed, by the

LED. Individually, they provide the services of their respective crafts. Collectively, they work as a team or teams to assist in the initial mitigation of hazardous material spills, rescue, first aid, staging area management, resource accountability, communications, and other duties for which they have been trained. They are trained to support other response units, as needed.

Each major ORNL building has a local emergency squad made up of employees who are familiar with their building and its operations. The number of members assigned to each Local Emergency Squad varies with the size, population, and complexity of each facility. Members are normally available during regular day shift hours only, Monday through Friday. They respond to all emergencies at their particular facility and perform duties as directed by the Local Emergency Supervisor.

2.a. Laboratory Emergency Director (LED)

The LSS shall assume the role of the ORNL LED until such time as he or she is relieved of that responsibility by the Crisis Manager or a designated alternate. If the LSS on duty is incapacitated during an emergency, the first alternate is any other LSS who may be present on-site. The LED shall ensure that the Crisis Manager or designated alternate is promptly notified of an emergency condition.

The LED will (1) provide continuous site-wide emergency direction; (2) direct the overall effort to respond to operational events and emergencies; (3) assess the event to determine the hazard and its consequences and make an initial classification based on emergency action levels; and (4) alert and mobilize sufficient response forces, including technical assistance, to respond to the requirements of the emergency.

The LED will direct a team response effort. Emergency functions and responsibilities of key personnel on each shift have been designated. These functions include emergency response for fire, hazardous materials events, radiological emergencies, security events, energy and utility interruptions, medical assistance, rescue, environmental monitoring, and damage control. Individual emergency response duties and regularly assigned responsibilities are correlated wherever possible.

Other functional responsibilities of the LED include the following:

- activate alarms or communication systems to notify emergency units;
- initiate appropriate notifications as shown in Fig. 1 and protective action recommendations to off-site organizations
- appoint emergency management personnel from qualified on-shift personnel for assistance with current and continuing emergency control but assume those responsibilities until the positions are filled;
- augment the ORNL emergency response organization with emergency call-list personnel and other available staff members, as appropriate;
- continue assessment of emergency status and make appropriate protective action recommendations to off-site organizations;
- ensure that information to be released is accurate and released through the proper channels;

- request outside assistance, if applicable;
- remain alert to radiological conditions and other hazards with the potential for significant effect on the health and/or safety of on-site ORNL personnel and, where necessary, implement appropriate protective measures, including emergency exposure limits, sheltering-in-place, and partial or full-site evacuation;
- determine the accessibility of site areas both during and after an emergency and authorize re-entry of evacuated areas. Request a technical group to assist in evaluating the advisability of re-entry;
- authorize all rescue efforts requiring re-entry into an evacuated area;
- ensure that the IC at the scene of the emergency directs emergency service unit and local emergency squads;
- ensure that the IC at the scene of the emergency evaluates
 - radiation and general safety situations as they affect the immediate and adjacent areas,
 - need for interrupting utility services such as process water, ventilation, oxygen, and electricity, and
 - need for operational changes;
- consider the need for and arrange for any large-scale alert, evacuation, general alert, invocation of mutual assistance agreements, and procurement of additional emergency personnel or emergency equipment;
- keep management and appropriate staff informed; and
- determine when the emergency is over and order the "all clear" signal.

waste management, environmental protection, safety and health protection, etc.).

2.c. All Employees

One of the most critical factors in combating emergencies is the ability of the person discovering an emergency to act immediately with knowledge of what to do and where to get prompt help. Each employee should notify the LSS and be thoroughly familiar with the

- responsibilities of a person discovering an emergency;
- location and use of fire-fighting and other emergency equipment in the immediate area;
- assembly points for local and ORNL-wide evacuations;
- local and ORNL-wide alarms and signals (fire, evacuation, etc.); and
- names of local emergency personnel in the immediate area.

In an emergency, employees should follow directions of local emergency squad personnel and/or instructions over the public address system.

When instructed to evacuate by alarm or voice, employees should

- shut down equipment, if practicable;
- quickly leave the building or immediate area;
- proceed to the local assembly point; and
- remain at the local assembly point until otherwise instructed.

3. IMPLEMENTATION OF THE CONTINGENCY PLAN

The decision to implement this contingency plan as part of the *site emergency plan* depends upon whether an imminent or actual incident at a TSD could threaten health or the environment. The plan will be implemented whenever there is a fire, explosion, or any unplanned sudden or nonsudden release of hazardous waste constituents to the air, soil, or surface water at a RCRA unit that could threaten human health or the environment. The plan will be carried out immediately when any such fire, explosion, release, etc., occurs.

The contingency plan will be implemented by the LSS in the following situations.

A fire and/or an explosion occurs at a RCRA TSD unit, such that

- potential for human injury exists;
- toxic fumes could be generated;
- spreading of fire could cause heat-induced explosions or could ignite materials at other locations;
- water or chemicals used in fire fighting could result in contaminated runoff (Note: water should not be used on fires at facilities storing TRU or Class III/IV waste);

- explosion could cause a safety hazard from flying fragments or shock waves;
- other hazardous wastes could be ignited from an explosion; and
- toxic material could be released as a result of explosion.

A material release or spill occurs at a RCRA TSD unit, such that

- fire hazard or gas explosion hazard could result from flammable liquids or vapors from a spill;
- toxic fumes or liquids could be released that would endanger human health or the environment;
- release could result in soil contamination and/or groundwater or surface water pollution that could endanger human health or the environment; and
- spill that cannot be contained could result in off-site ground or surface water pollution and/or soil contamination.

See Section 5 for additional information.

4. CONTROL PROCEDURES -- INCIDENT COMMANDER

The initial response to a facility emergency may be provided by the Local Emergency Supervisor/ local emergency squad or the first arriving emergency response officer. Once the Incident Command System is established, the command and control of the emergency squad is transferred to the IC. Command and control begins with the IC at the event scene. The IC has the authority to implement protective and mitigative actions within the event scene designated by the LSS. Incident Command may be transferred between the ORNL Fire Department and Protective Force based on the type (non-security vs. security event) of emergency situation. Incident Command may be transferred to representatives of other Federal Agencies (i.e., Federal Bureau of Investigation or Environmental Protection Agency) in accordance with the *National Response Plan*. The IC is responsible for assuming command and control of emergency response at the scene of the incident until such time that the area is determined to no longer be in a state of emergency. At that time, the IC will turn the area over to the area supervisor. The IC is responsible for the following:

- initiate evacuation of area if required;
- conduct initial evaluation of magnitude of problem;
- establish control and set up a command post for emergency response;
- restrict entry to properly equipped personnel;
- implement applicable prearranged plans and procedures, including
 - direct operational changes needed, such as shutting off the flow of water, electricity, natural gas, or high-pressure fluids if they might aggravate the situation;
 - if a liquid or gaseous release occurs, call industrial hygiene personnel to take atmospheric samples to determine the concentration (vapors from unknown liquid

spills can be extremely hazardous to responding personnel);

- if a radiation release occurs, call Radiation Protection to take samples to determine the extent of contamination;
- initiate cleanup and properly manage wastes generated during the cleanup;
- obtain medical attention for any injured persons;
- notify environmental protection organization(s) of emergency event and report any information known at this point;
- contact other emergency service units, as required;
- arrange for assembly, organization, and briefing of emergency response personnel who have been summoned; and
- continue to provide incident control and updated status reports on situation until relieved.

The following additional actions will be taken at TSD units affected by a fire or explosion. Note: water will not be used on reactive or TRU wastes.

- Shut down work in the affected areas immediately;
- shut down feedlines and additional equipment, as necessary and practical; and
- clear all personnel not actively involved in fighting the fire from the area. These persons are to report to the designated assembly points for accountability.

See Section 5 for additional information.

5. EMERGENCY RESPONSE PROCEDURES FOR SPILLS, HAZARDOUS MATERIAL RELEASE, FIRE, OR EXPLOSION – EMERGENCY COORDINATOR

5.a. Internal Notifications

The person discovering a potential emergency incident will immediately notify the LSS at 911, or if using a cell phone, dials 574-6606, and notify his or her immediate supervisor. Individuals with radio communication can contact the LERC on the ORNL Emergency Management Radio Network. The radio dispatcher will notify the LSS, who will dispatch the necessary emergency service units to the scene and will others, as necessary. The individual may also pull the nearest fire alarm box to summon assistance.

The LSS will immediately activate the internal alarm system to notify or evacuate personnel if necessary. The LSS will notify all appropriate facility personnel (see Fig. 1), including other DOE contractors, co-owners and co-operators, and outside agencies, according to the *site emergency plan* (see Section 5.d).

5.b. Identification of Hazardous Materials

Once an emergency situation has been reported, the LED is dispatched to the scene. The LED is trained in the recognition of hazardous materials and will verify the discoverer's evaluation. The

LED will determine the extent, cause, and characteristics of the release (amount and area extent) and contact the appropriate staff for cleanup operations. The methods that can be utilized in the identification of character, source, amount, and extent of release include direct observation, a review of unit operating records, inventories, log sheets, manifests and other tracking records, and chemical analysis results. Information sources to support the identification process are available at the LSS office, the hazardous waste organization, and the environmental protection organization and include facility drawings, Material Safety Data Sheets (MSDSs), the SPCC Plan, chemical reference books, and sewer and water-line drawings.

5.c. Hazard Assessment

Assessment of possible hazards to human health or the environment will be made using the following methods:

- process knowledge (i.e., knowledge of the nature of the waste materials released);
- review of MSDSs, if available;
- chemical analysis and/or monitoring data;
- results of modeling for releases to air, surface water, or groundwater; and
- specific health-based and environmental criteria or limits which may be exceeded.

Based on the hazard assessment, evacuation of the immediate unit area, entire facility, or local areas outside the facility may be necessary.

The LED will consult with various support organizations, as necessary, to evaluate the potential hazards of the emergency event.

5.d. Off-Site Notification and Evacuation

If a release of hazardous constituents has occurred that could threaten human health or the environment off-site, the LED will initiate steps to notify appropriate local and government authorities. That notification should indicate whether evacuation of local areas is recommended and should assist local officials in decisions regarding evacuation of local areas. Individuals or groups that may be notified include, but are not limited to, the following:

- DOE Oak Ridge Operations EOC,
- DOE Headquarters EOC (through the Oak Ridge Operations EOC voice bridge),
- Tennessee Emergency Management Agency,
- National Response Center,
- local emergency planning councils,
- affected county notification points,
- city of Oak Ridge (Anderson County),
- regional U.S. Environmental Protection Agency, and
- other agencies as required by regulatory guidance.

Evacuation of nonessential personnel is ordered by the LED if it is determined that a threat to the safety of personnel exists.

When notifying the National Response Center, the report must include the following:

- name and telephone number of reporter;
- name and address of facility;
- time and type of incident (e.g., release, fire);
- name and quantity of material(s) involved, to the extent known;
- extent of injuries, if any; and
- possible hazards to human health or the environment outside the facility.

More information is available in the *site emergency plan*.

5.e. Prevention of Recurrence or Spread of Fires, Explosions, Releases

The LED is responsible for ensuring that fires, explosions, or releases do not occur, recur, or spread to other hazardous waste at the unit. The LED will, as appropriate, arrange to survey and monitor the affected area to establish protective boundaries; shut down and monitor processes; collect and contain released wastes; and remove and isolate any damaged containers.

The LED is responsible for ensuring that provisions are made to monitor for leaks, pressure buildup, gas generation, or ruptures, as appropriate, if operations at the unit are stopped in response to a release, fire, or explosion.

5.f. Storage and Treatment of Released Material

Any hazardous materials that result from a release, fire, or explosion at ORNL will be contained, removed, and placed in appropriate containers or tanks. Leaking or damaged containers will be placed in overpack containers so they can be stored until treatment or disposal arrangements are finalized.

Contaminated absorbent materials, protective clothing, and other disposable material used in remediation of the emergency and subsequent decontamination activities will be placed in containers and stored at a RCRA storage unit pending treatment or disposal. These items will be handled with the same degree of caution as the wastes themselves so that public health and the environment are not further threatened. Emergency equipment available at ORNL is identified in Section 6.

5.g. Incompatible Wastes

Waste management personnel will ensure that any wastes that may be incompatible with any spilled or released material are moved to a safe storage location until all cleanup operations have been completed.

5.h. Post-emergency Equipment Maintenance

All emergency response teams will ensure that team equipment is properly decontaminated according to the type and level of contamination, that supplies are restocked, and that equipment and supplies are returned to pre-emergency readiness.

Notification will be made by the LED in consultation with the Recovery Manager to the state commissioner and local authorities that (1) no waste that was incompatible with the released material was treated, stored, or disposed of until cleanup procedures had been completed and (2) post-emergency equipment maintenance has been completed and operations will be resumed.

5.i. Container Spills and Leakage

In the event of a hazardous material spill or release, the following general procedures will be used for rapid and safe response and control of the situation. Spills or releases and impending spills or

releases discovered during routine inspections will be handled in the same manner as described below for spill and release emergencies. These are general guidelines, however, and circumstances may dictate some alterations to these procedures.

The person discovering a potential emergency incident will immediately notify the LSS at 911, or if using a cell phone, dials 574-6606, and notify his or her immediate supervisor. Individuals with radio communication can contact the LERC on the ORNL Emergency Management Radio Network. The radio dispatcher will notify the LSS, who will dispatch the necessary emergency service units to the scene and will notify others, as necessary. The individual may also pull the nearest fire alarm box to summon assistance.

The area supervisor or the employee will provide the following information, if known:

- the material spilled or released;
- the location and source of the release or spillage of hazardous material;
- an estimate of the quantity released and the rate at which it is being released;
- the direction in which the spill, vapor, or smoke release is heading;
- any injuries involved; and
- fire and/or explosion or the possibility of such events.

This information will help the LSS to assess the magnitude and potential seriousness of the spill or release. The LSS will contact and deploy the necessary personnel. If additional assistance is required, the LSS will also contact the other Oak Ridge plants that have agreed to provide assistance and, if necessary, the agencies discussed in Section 7 of this plan.

The initial response to any emergency will be to protect human health and safety and then the environment. Identification, containment, treatment, and disposal assessment will be the secondary responses. Off-site notifications of the release will be made when applicable.

Medical assistance for injured persons will be obtained from the medical staff and/or the Methodist Medical Center of Oak Ridge.

Cleanup personnel will don the appropriate protective clothing and equipment. If a flammable waste is involved, all ignition sources will be removed, and spark and explosion-proof equipment and clothing will be used for containment and cleanup activities. If possible, emergency response personnel will try to stop the leak. All surrounding materials that could be reactive with the waste materials will be removed. The major components of the waste will be determined.

Absorbent pads, booms, earth, sandbags, sand, and other inert materials will be used to contain, divert, and clean up a spill if it has not been contained by a dike or sump. Spills contained within a dike or sump may be pumped back into the appropriate storage tank or drum if it is structurally sound. All containment and cleanup materials will be placed in drums for proper disposal. All recovered liquid wastes and contaminated soil that cannot be returned to their original storage tanks or containers will be containerized within 24 hours.

If, for some reason, a chemical spill is not contained within a dike or sump area, an appropriately sized area of isolation will be established around the spill. The size of the area will generally depend on the size of the spill and the materials involved. When any spill occurs, only those persons involved in overseeing or performing emergency operations will be allowed within the designated hazard area. If possible, the area will be roped or otherwise blocked off. All persons not actively involved in managing the spill will be kept upwind.

All emergency equipment used for spill management must be cleaned or replaced by the responsible personnel so that it is fit for use prior to resumption of plant operations in the affected areas.

5.J. Tank Spills and Leakage

Any tank spills or leakage of hazardous waste will be discovered within 24 h of the occurrence through routine daily inspections of those tanks. If a leak or spill is detected, no additional waste will be added to the tank, and the system will be inspected to determine the cause of the leak. If possible, the tank may be temporarily plugged to prevent further release of hazardous waste to the environment and to allow inspection and/or repair of the tank system. The contents (of the tank or the secondary containment) will be transferred to containers or a tanker truck as appropriate within 24 h when possible. However, additional time may be utilized if it can be demonstrated that it is impossible to complete that transfer within 24 h.

A visual inspection of the surrounding environs and measures to prevent further migration of the leak to the environs must be conducted at the release site. If the inspection indicates that hazardous wastes have been released to the environment, all visibly contaminated soil and surface waters must be collected and properly disposed of. The appropriate agencies will be notified within 24 h of discovery unless the spill involves less than or equal to 1 lb of hazardous waste and is immediately contained and cleaned up. The tank or piping will be repaired or replaced. All tank equipment, either new or repaired, will be certified by an independent engineer before use.

6. GENERAL ORNL EMERGENCY EQUIPMENT

ORNL maintains equipment for earth moving, decontamination, rescue team, transportation, personnel protective, monitoring, sanitation and survival, damage containment, fire-fighting, and emergency power.

Emergency equipment and instrumentation are located in ORNL facilities, in separate facilities near where the potential for a serious accident exists, and in the emergency and alternate control centers. Such equipment consists of protective clothing, respirators, medical supplies, various types of portable radiation-detection equipment, and equipment for analyzing various chemicals.

Mobile units are available for emergency use (some have radio communications capability). These units are equipped with various types of respirators, radiation-detection equipment, protective clothing, medical supplies, and various other types of life-saving equipment.

In addition, numerous DOE-owned vehicles are on-site and available for emergency use. These consist primarily of sedans, station wagons, buses, and trucks. Included in the group are special-purpose vehicles, a mobile change house, a mobile counting laboratory, and two ambulances equipped with medical supplies and capable of handling low-level irradiated and/or contaminated persons. (A list of the individuals or organizations assigned to each vehicle is available from the LSS.)

The Fire Department at ORNL is well equipped with vehicles and fire-fighting equipment. ORNL has an extensive fixed fire protection system, including automatic sprinkler systems, heat and smoke detectors, and fire alarms.

Personnel involved in responding to emergency situations at ORNL including the WPF are aware of the locations of emergency equipment and vehicles. One of the responsibilities of the Local Emergency Supervisor is to organize and train individuals in his/her squad. A part of this training deals with location of equipment.

The emergency equipment stored at the hazardous waste units is maintained by the appropriate contractor's waste management organization. All technical personnel in these groups are well versed in the use and location of this equipment as part of their initial on-the-job training. Locations

of emergency equipment storage maintained by UT-Battelle are indicated on Map 1.

Spill response materials and equipment (lime, soda ash, absorbent materials, oil pads/booms, tanker trucks for spilled material and decontamination solutions, hand tools, heavy equipment, etc.) are maintained by the maintenance staff.

6.a. Emergency Equipment at Hazardous Waste Facilities

ORNL has requested a waiver for the storage of emergency supplies at the TRU and Class III/IV storage facilities because of the radiation levels in these units. Limited emergency supplies are (or will be for proposed units) located at ORNL's other hazardous waste storage units because general supplies of emergency response equipment are maintained primarily at another ORNL location, Building 3621. Refer to Map 1 to identify the locations of ORNL's general supplies of emergency equipment. Appendix B provides examples of the response equipment located at the hazardous and mixed-waste storage units.

6.b. Emergency Spill Response Vehicles

Hazardous Material, Emergency Spill Response Vehicle

This vehicle is equipped with items necessary to make the first response to a spill. Items in the truck include fire extinguishers, fire blankets, absorbent materials, rags, protective clothing, tools, and rope.

Spill Response Van

This vehicle is equipped with items necessary to make the first response to a spill. Items in the van typically include fire extinguishers, absorbent materials, rags, protective clothing, tools, nonsparking tools, generator, exhaust fan, spill kits, floodlights, emergency eye wash, rope, and a wedge and plug kit.

6.c. Additional Emergency Response Equipment

The Lead contractor Laboratory Waste Services organization maintains a large supply of emergency response equipment and supplies at Building 3621 typically consisting of the following items:

- absorbent
- vacuum cleaner
- clay absorbent
- vermiculite
- absorbent boom bails
- absorbent pads
- safety glasses
- gloves
- tape
- wooden stakes (for oil booms)
- rope
- pH paper
- rubber boots
- shoe covers
- plastic bags
- paper coveralls
- ball-peen hammer
- drum liners (for 55-gal)
- 55-gal drums (open and bung top)
- 30-gal drums (open and bung top)
- 85-gal overpack drum
- oil booms
- absorbent pigs
- sand bags
- fire extinguisher

The ORNL Fire Department also maintains the following emergency response equipment at the

ORNL Fire Station, Building 2500:

- three pumpers equipped with standard emergency equipment and foam (100 gal per vehicle)
- extra foam, approximately 50 to 60 gal

6.d. Respiratory Protection Equipment

The different types of respiratory protection equipment are available from the industrial hygiene organization and from the emergency response vehicles. All respirators, canisters, and cartridges have limitations. The Safety Services Division should be consulted about the equipment that should be used, if time allows. If consultation time is not available, a self-contained breathing apparatus should be used by a trained employee.

7. COORDINATION AGREEMENTS - ARRANGEMENTS WITH LOCAL AUTHORITIES

Mutual assistance agreements for the three Oak Ridge sites and several Oak Ridge agencies (e.g., the Methodist Medical Center of Oak Ridge and the Oak Ridge Fire Department) have been negotiated by DOE-ORO. Examples of the agreements are included in the *site emergency plan*. Copies of the ORNL Site Contingency Plan are submitted to each of these by certified mail. Records of those submittals are maintained in ORNL operating records. ORNL conducted a training familiarization program for local authorities who could be called on to provide assistance.

If a fire, explosion, or hazardous material(s) release occurs, the following agencies will respond as requested by the LED (assistance from supporting departments will be solicited only by the LED):

Police - ORNL Protective Force, ETTP Protective Force, Y-12 Protective Force, or the Oak Ridge Police Department.

Fire - ORNL Fire Department, ETTP Fire Department, Y-12 Fire Department, or the Oak Ridge Fire Department.

Emergency Response Team - LSS, Fire Department and Protective Force, Laboratory Waste Services Organization.

Medical - ORNL Medical Department or the Methodist Medical Center of Oak Ridge.

Note: Formalized mutual assistance agreements with other DOE facilities or Methodist Medical Center of Oak Ridge are not required per communication with DOE staff.

8. EVACUATION PLAN - ORNL-WIDE ALERTS AND MOVEMENTS TO POINTS OF SAFETY

If the entire ORNL area or a major portion thereof is in jeopardy or judged unsafe for any reason, an ORNL-wide alert is sounded. Situations that might necessitate an ORNL-wide alert include a fire, explosion, or release of hazardous wastes or hazardous constituents that could endanger human health or the environment. All types of alerts (National Weather Service, DOE, Civil Defense, etc.) and reports of accidents (including those outside the jurisdiction of ORNL) involving fire, explosion, criticality, and radioactive or toxic material should be reported to the ORNL communications center

(telephone 911 or 574-6606). The dispatcher at the ORNL communications center reports this information immediately to the LED and to all emergency service units affected.

The LED evaluates the situation and selects an appropriate course of action. Instructions are to be given over the public address system by the LED or his/her designated representative. If an explosion, fire, spill, or release of a volume of hazardous waste sufficient to threaten human health occurs, personnel are evacuated. Additionally, if the release exceeds the threshold limit value (TLV) or an accurate determination of the concentration cannot be accurately determined, personnel are evacuated.

Local Emergency Supervisors and their emergency squads take steps to ensure that all employees in their areas are aware of the alert and that appropriate action is initiated to place building and equipment shutdown plans in effect.

Local Emergency Supervisors and squads assist personnel in moving to the local assembly point or specified points of safety and complying with instructions from the LED.

The Protective Force establishes radio communications from the principal assembly points and maintains contact with the other Oak Ridge installations and DOE.

The public address system, ORNL radio system, and/or sirens may be used for alerts or instructions when this is deemed advisable by the LED or the ranking ORNL protection officer. The various signals used at ORNL are described in detail in the *site emergency plan*.

Evacuation routes from hazardous waste management units are shown on Map 1.

9. REQUIRED REPORTS

The LSS will note in the operating record the time, date, and details of any incident that requires implementation of the Contingency Plan. Internal reports will be filed as required.

After the incident, the appropriate contractor's personnel will submit a written report on the incident that required implementation of the Contingency Plan to the DOE staff for review and transmittal to the Commissioner of the Tennessee Department of Environment and Conservation, as required by Tennessee Rule 1200-1-11-.06(5)(c). The report will include

- name, address, and telephone number of the owner or operator;
- name, address, and telephone number of the facility;
- date, time, and type of incident (e.g., fire, explosion);
- name and quantity of material(s) involved;
- extent of injuries, if any;
- assessment of actual or potential hazards to public health or the environment, where this is applicable; and
- estimated quantity and disposition of recovered material that resulted from the incident.

This report may also be used to notify the regulators that emergency equipment has been cleaned and is fit for its intended use before resuming operations in the affected areas and that no incompatible waste was treated or disposed of in the affected area.

APPENDIX 5-1

ORNL HAZARDOUS WASTE UNIT DESCRIPTIONS AND DRAWINGS

APPENDIX 5-1
ORNL HAZARDOUS WASTE UNIT DESCRIPTIONS AND DRAWINGS

**Table 5-1. Units included in the Oak Ridge National Laboratory
Part A Permit Application
for Management of Hazardous and Mixed Wastes**

Building No.	Facility Name	Radioactive Wastes Accepted ¹
INTERIM STATUS		
7822 ²	Solid Waste Storage Area (SWSA) 6	Yes
7667	Chemical Detonation Facility	No
7822A	Former Chemical Detonation Facility	No
No #	Hillcut Test Facility	Yes
7802N	SWSA 5 North, Trench 27	Yes
PERMIT TNHW-010A		
7652	Hazardous Waste Storage Facility	No
7507W	Mixed Waste Drum Storage Facility	Yes
7653	Chemical Waste Storage Facility	No
7654	Long-Term Hazardous Waste Storage Facility	Yes
7651	Used Oil Storage Facility	Yes
No #	Portable Sampling/Handling Unit 1	Yes
No #	Portable Sampling/Handling Unit 2	Yes
PERMIT TNHW-097³		
7855	Remote-Handled (RH) Transuranic (TRU) Retrievable Concrete Cask Storage Facility	Yes
7574	Nuclear Fuel Services, Inc. (NFS) TRU Storage Facility	Yes
7883	RH-TRU Storage Bunker	Yes
7879	TRU/Low Level Waste (LLW) Staging Facility	Yes
7823	Contact-Handled (CH) TRU Waste Storage Facility	Yes
7884	(Proposed) RH-TRU Waste Storage Bunker	Yes
7572	CH-TRU Waste Storage Facility	Yes
7577	(Proposed) TRU Storage Facility	Yes
7878 ⁴	SWSA 6 Staging Facility	Yes
7580	(Proposed) Solid Low-Level Waste Staging Facility	Yes
7576	(Proposed) Bulk Contaminated Soil Storage Facility	Yes
7842 ⁵	SWSA 6 Waste Storage Facility	Yes
WPF-1	Contact Handled Waste Staging Area	Yes
WPF-2	Waste Processing Facility (WPF) Second Floor	Yes
WPF-3	Drum Aging Criteria (DAC) Area	Yes
WPF-4	WPF First Floor	Yes
WPF-5	Container Storage Area (CSA)	Yes
WPF-6	Contact Handled Marshalling Building (CHMB)	Yes
T-1	Macroencapsulation	Yes
T-2	Amalgamation	Yes
T-3	Solidification/Stabilization	Yes

¹Effective May 1991, all ORNL RCRA waste storage units may be used for hazardous/mixed wastes as generation/space requires.

²RCRA wastes have been prohibited from disposal in SWSA 6 since 1986.

³Waste Examination and Assay Facility, Building 7824, was removed because it has been certified closed by TDEC.

⁴7878 has had waste removed and has been demolished and placed under SWSA 6 CERCLA cap as part of TDEC-approved closure.

⁵7842 has had waste removed and has been demolished and placed under SWSA 6 CERCLA cap as part of TDEC-approved closure.

SPECIFIC INFORMATION ON HAZARDOUS WASTE UNITS

Information on the specific hazardous waste units identified in Table 5-1 is provided in the following sections. The figures follow the unit descriptions.

INTERIM STATUS

SWSA 6, 7822

SWSA 6 has served as the principal disposal area for solid low-level radioactive waste since 1969 (Fig. 5-1). Historical records indicate that RCRA-hazardous wastes (process wastes, toluene, and lead) have been buried in portions of the SWSA. RCRA waste has not been accepted since 1986. The current Waste Acceptance Criteria (WAC) are designed to exclude RCRA wastes. Interim closure (capping) was initiated in 1988.

Chemical Detonation Facility, 7667

The Chemical Detonation Facility (Fig. 5-2) is used to treat highly reactive and/or unstable ignitable wastes that are capable of detonation, contain explosive constituents, or are explosive due to peroxide formation. Occasionally, small quantities of unknown wastes, which for personnel safety are assumed to be highly reactive, are also treated by detonation in this unit. The wastes are detonated in a trench using explosive material and electric blasting caps. The explosive material and electric blasting caps are stored separately in two magazines as specified by Tennessee Blasting Standards, the DOE Explosives Safety Manual, Bechtel Jacobs Company, LLC, safety and health procedures, and ORNL Industrial Safety.

Former Chemical Detonation Facility, 7822A

This unit was used to detonate nonradioactively contaminated explosive wastes. The unit consisted of a trench and a control site (Fig. 5-3). Operation of this unit ceased when the new Chemical Detonation Facility, 7667, became operational. Closure of this unit is being conducted in conjunction with the closure of SWSA 6.

Hillcut Test Facility, No Building Number Assigned

The Hillcut Test Facility (Fig. 5-4) consists of 27 concrete boxes (each 3.5 ft by 4.5 ft by 4.5 ft) stacked on a concrete pad in a 3-box by 3-box by 3-box arrangement and then covered over with backfill. The boxes were used to store solid radioactive wastes. Some of the boxes contain small amounts of RCRA materials such as lead. Five boxes contain Eu-contaminated soil. Most of the radioactivity in the stored materials is derived from Cs and Eu.

SWSA 5 North, Trench 27, 7802N

The RH-TRU Retrievable Storage Area in SWSA 5 North was used in the 1970s for the retrievable burial of concrete casks in trenches. Approximately 10 ft deep by 6 ft wide and of variable length, the TRU trenches were designed primarily for the interim storage of concrete casks. Trench 27 contains approximately 400 lb of lead bricks in a wooden box. The waste in Trench 27 is located 5 ft from the end of the trench and 4 ft from the top (Fig. 5-5).

PERMIT TNHW-010A

Hazardous Waste Storage Facility, Building 7652

Building 7652 is constructed of insulated, prefabricated metal walls and roof (i.e., Butler-type construction) over a concrete pad. It is approximately 40 ft by 63 ft. This includes an outside covered storage area with dimensions of 39 ft by 20 ft. The building is divided into six curbed storage areas (including the outside covered storage area; see Fig. 5-6). The enclosed section of the building consists of five storage areas. Wastes may include laboratory chemical wastes; bulk quantities of ignitable, corrosive, toxic wastes; oxidizers; poisons; soils; etc. Wastes are stored in containers (30- or 55-gal or overpack drums).

Mixed Waste Drum Storage Facility, Building 7507W

Building 7507W is a 40-ft by 40-ft concrete pad with a prefabricated Quonset-hut-type metal cover (Fig. 5-7). Mixed wastes are stored in containers (30- or 55-gal or overpack drums); radioactivity levels (dose equivalent rates at the surface of the container) of the waste are generally 10 mrem/h or lower. Wastes stored at this unit include scintillation vials, scintillation fluids, used oils, waste waters, contaminated soils, or other hazardous wastes. Radioisotopes present include, but are not limited to, H-3, C-14, P-32, and I-131.

Chemical Waste Storage Facility, Building 7653

Building 7653 is constructed of insulated, prefabricated metal walls and roof (i.e., Butler-type construction) and has dimensions of 30 ft by 102 ft 8 in. Building 7653 is divided into seven storage cells and an office (Fig. 5-8). Each cell has curbing with a centralized sump except for Cell G, which is used for storing reactive wastes. Curbing with a centralized sump is utilized for each of the storage cells (except for the water reactive storage cell). The unit is used to store small containers (less than 5 gal or less than 20 lb) of excess or outdated laboratory chemicals and process chemical wastes. The wastes are stored on shelving units, in cabinets, or in other storage devices compatible with the type and quantity of waste stored.

Long-Term Hazardous Waste Storage Facility, Building 7654

Building 7654 is constructed of insulated, prefabricated metal walls and roof over a concrete pad. It has dimensions of approximately 39 ft by 43 ft. The floor area is divided into five curbed storage areas (Fig. 5-9). The building is used for storage of mixed wastes; radioactivity levels (dose equivalent rates at the surface of the container) are generally 10 mrem/h or less. The wastes include waste oils, waste solvents, corrosives, poisons, or other process wastes. The principal components of scintillation fluid are toluene and/or xylene; radioisotopes include H-3, C-14, P-32, and I-131. Wastes are stored in containers (30- or 55-gal or overpack drums).

Used Oil Storage Facility, Building 7651

This unit is a 40-ft by 20-ft concrete pad (Fig. 5-10) covered with a ribbed metal roof. The pad is used for the storage of used oil suitable for recycling but may at times be used to store other types of hazardous or mixed wastes. Building 7651 will not be used to store reactive wastes. Wastes are stored in DOT-approved containers (30- or 55-gal or overpack drums), but other types of containers may be used.

Portable Sampling/Handling Units 1 and 2, No Buildings Numbers Assigned

Two portable units are constructed of heavy gauge steel and Underwriter's Laboratories, Inc., (UL)-classified fire-resistive gypsum wallboard. The roof/ceiling assembly is permanently attached to the exterior walls. The portable units have approximate dimensions of 15 ft 10 in. by 9 ft 6 in. each (Fig. 5-11). The units are mounted on trailers to provide a means of transporting the units to the different waste storage units. The portable units are used for mixed waste sorting, sampling, compositing, and/or repackaging operations. Each unit can be physically moved to an open area adjacent to the storage unit where the hazardous/mixed wastes are stored to facilitate waste transfers between the two units.

PERMIT TNH-097

RH-TRU Retrievable Concrete Cask Storage Facility, Building 7855

Building 7855 is a concrete block structure on a reinforced concrete slab with a reinforced concrete roof (Fig. 5-12). The unit is used to store concrete casks containing RH-TRU waste. The structure is primarily below grade, except for the southern side. The structure is divided into four bays by concrete block walls that extend from the floor to the roof. Each bay of the unit is approximately 15 ft by 45 ft. The building is approximately 60 ft by 45 ft. Some of the casks contain limited amounts of RCRA constituents, primarily lead and mercury.

NFS TRU Storage Facility, Building 7574

Building 7574 is constructed of metal siding and roof over a concrete pad. The metal, Butler-type building has inside dimensions of approximately 83 ft by 50 ft (Fig. 5-13). This unit stores CH-TRU solid waste in DOT-approved drums (30- or 55-gal or overpack drums) and/or boxes. As space permits, LLW may also be stored in this unit. RCRA metals are the primary contaminants in the CH-TRU wastes.

RH-TRU Storage Bunker, Building 7883

Building 7883 is a concrete block structure on a reinforced concrete slab with a reinforced concrete roof (Fig. 5-14). The structure is primarily below grade, except for the bay access side. The structure is divided into four bays by concrete block walls that extend from the floor to the roof. Each bay of the unit is approximately 18 ft by 55 ft. Overall, the unit is approximately 72 ft by 55 ft. The unit is used to store concrete casks containing RH-TRU waste. Some of the casks may contain lead, mercury, or other RCRA metals and PCBs. Unused bays in this unit may at times be used to store solid low-level waste (SLLW).

TRU/LLW Staging Facility, Building 7879

Building 7879 is constructed of metal siding and roof with a rigid frame over a concrete pad. The metal Butler-type building has inside dimensions of approximately 50 ft by 83 ft (Fig. 5-15). The TRU/LLW Staging Facility stores solid CH-TRU waste contained in drums (30- or 55-gal or overpack drums) and/or metal boxes. Some of the containers store small amounts of lead, mercury, or other RCRA metals. Other RCRA wastes may include sludges, aerosol cans, etc. RCRA-regulated mixed waste is separated from waste that is radioactive only.

CH-TRU Waste Storage Facility, Building 7823

Building 7823 has dimensions of approximately 49 ft by 80 ft. It is a steel-framed building that is partially underground. Half sections of large corrugated metal pipe are used as siding (Fig. 5-16). The building has a concrete floor, wire fabric ceiling, and metal roof. Building 7823 is used to store LLW and CH-TRU waste containers (30- or 55- or 85-gal or overpack drums, metal boxes, and/or concrete casks in metal overpacks), some of which may be RCRA regulated. It also stores radioactively contaminated LLW (non-RCRA).

(Proposed) RH-TRU Waste Storage Bunker, Building 7884

Building 7884 will be a concrete block structure on a reinforced concrete slab with a reinforced concrete roof (Fig. 5-17). The structure will be primarily below grade, except for the access side. Overall, the building's dimensions will be approximately 115 ft by 59 ft. The unit will be used to store concrete casks containing RH-TRU waste. Some of the casks may contain lead, mercury, or other RCRA metals that classify the waste as mixed waste. Unused bays in this unit may also be used to store SLLW, as needed.

CH-TRU Waste Storage Facility, Building 7572

This unit is constructed of a metal roof and walls over a concrete pad (Fig. 5-18). Overall dimensions are approximately 140 ft by 50 ft. This unit is used to store CH-TRU mixed waste or LLW. Wastes are stored in drums (30- or 55-gal or overpack drums) or metal boxes. Some of the drums or boxes may contain small amounts of lead, mercury, cadmium, or other RCRA wastes. Other RCRA wastes may include sludges, aerosol cans.

(Proposed) TRU Storage Facility, Building 7577

This proposed unit will be a Butler-type building consisting of a metal roof and side panels on a reinforced concrete pad. The unit will be divided into three bays (see Fig. 519). The overall building dimensions will be approximately 150 ft by 60 ft. This unit will be used to store CH-TRU mixed waste and LLW in drums or boxes.

SWSA 6 Staging Facility, Building 7878

This building is constructed with metal walls and roof over a concrete pad approximately 40 ft by 80 ft (Fig. 5-20). Wastes are generally stored in DOT-approved containers (30- or 55-gal or overpack drums) or metal and wooden boxes. This unit is used to store containers of mixed waste consisting of hazardous and CH-TRU-radioactive components. 7878 has had waste removed and has been demolished and placed under SWSA 6 CERCLA cap as part of TDEC-approved closure. Closure certification is pending completion of SWSA 6 capping project.

(Proposed) Solid Low-Level Waste Staging Facility, Building 7580

This building will consist of an approximately 50-ft by 80-ft reinforced concrete floor with metal walls and roofing (Fig. 5-21). Wastes will generally be stored in drums (30-gal or 55-gal or overpack drums) and boxes of varying dimensions. This proposed unit will provide interim storage and a staging area for containers of mixed CH-TRU and SLLW wastes.

(Proposed) Bulk Contaminated Soil Storage Facility, Building 7576

Building 7576 will be an approximately 50-ft by 100-ft metal structure over a reinforced concrete floor surrounded by a 6-in. concrete dike (Fig. 5-22). The proposed unit will store excavated soils from maintenance and construction activities at ORNL. The unit will store metal containers (drums or boxes) of CH-TRU or low-level contaminated soils that may also be co-contaminated with hazardous wastes.

SWSA 6 Waste Storage Facility, Building 7842

Building 7842 is a Butler-type rigid-frame construction with metal walls and roof constructed on a reinforced concrete floor (Fig. 5-23). Inside dimensions of the structure are 47 ft by 72 ft. This unit will be used for storage of solid CH-TRU radioactive mixed wastes, SLLW, and mixed wastes (primarily radioactive wastes with small amounts of RCRA metal contaminants). The wastes will be stored in 30- or 55-gal or overpack drums. 7842 has had waste removed and has been demolished and placed under SWSA 6 CERCLA cap as part of TDEC-approved closure. Closure certification is pending completion of SWSA 6 capping project.

TRU Waste Processing Facility (WPF)

The project involves a single, compact Process Building approximately 120 ft west of the Melton Valley Storage Tank Vault at ORNL, two pre-fabricated metal support facilities constructed to protect the containerized CH solid waste from the weather upon receipt (the CHSA and the CHMB), and portable waste transport containers, referred to as Drum Aging Criteria (DACs) Area, used to protect the containerized CH solid waste from the weather during drum aging prior to equilibration for head space gas sampling. This facility will be used for storage and/or treatment of CH-TRU radioactive mixed wastes, RH-TRU radioactive mixed wastes, and low level mixed wastes. Additional portable waste transport containers, the ME Building, referred to as Container Storage Area (CSA), and the CHMB will be used for temporary storage of waste. The wastes will be stored in miscellaneous containers, including drums and boxes of various sizes (Figs. 5-24, 5-25, 5-26, 5-27, 5-28 and 5-29).

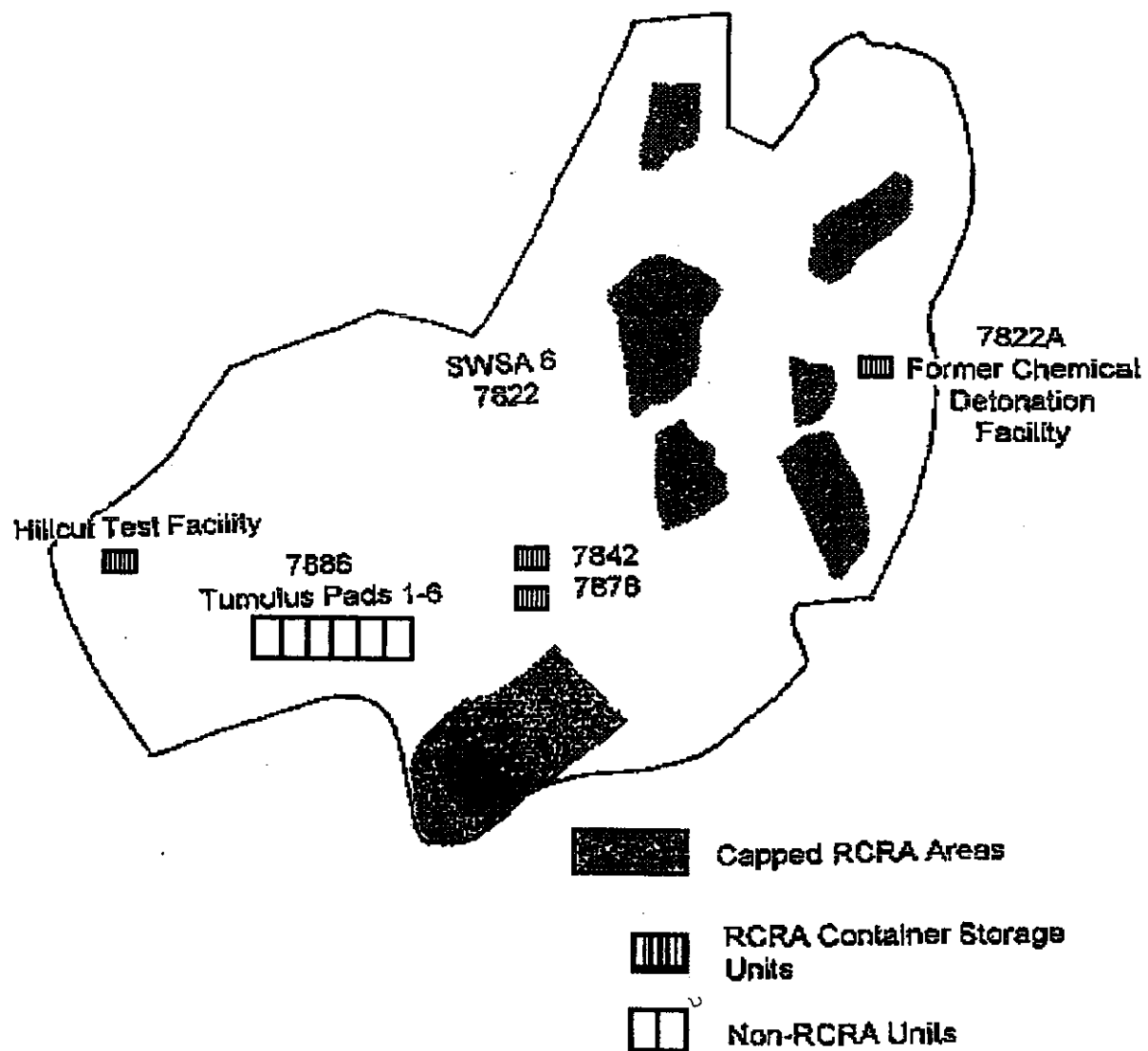


Fig. 5-1. SWSA 6, 7822.

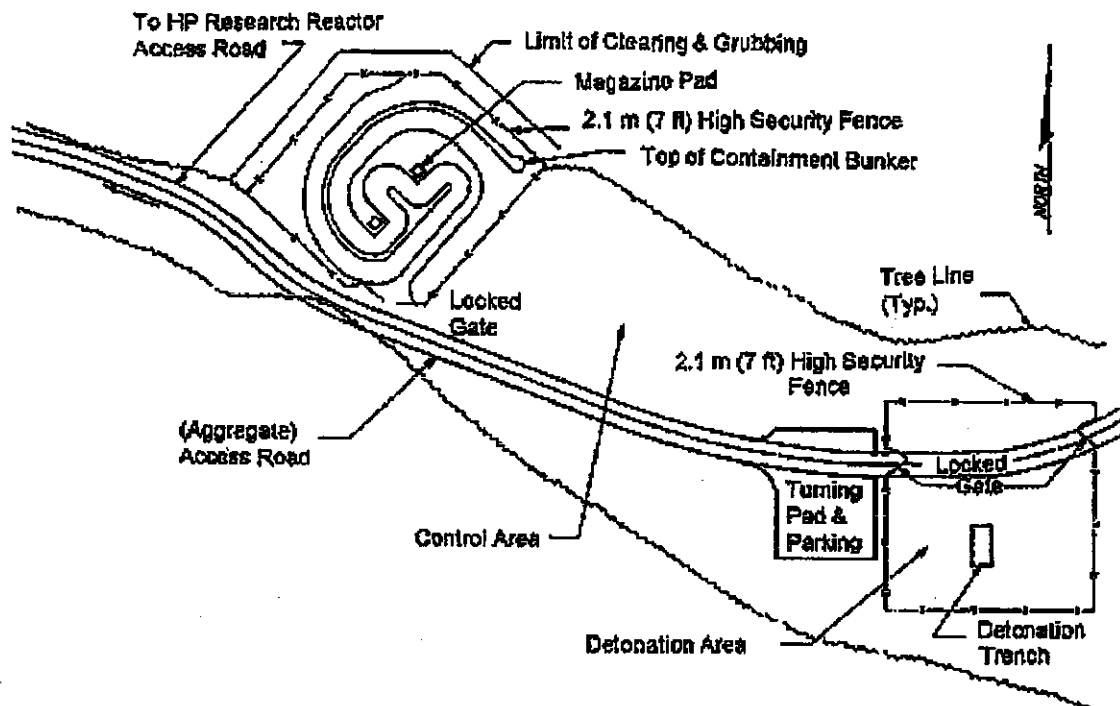


Fig. 5-2. Chemical Detonation Facility, 7667.

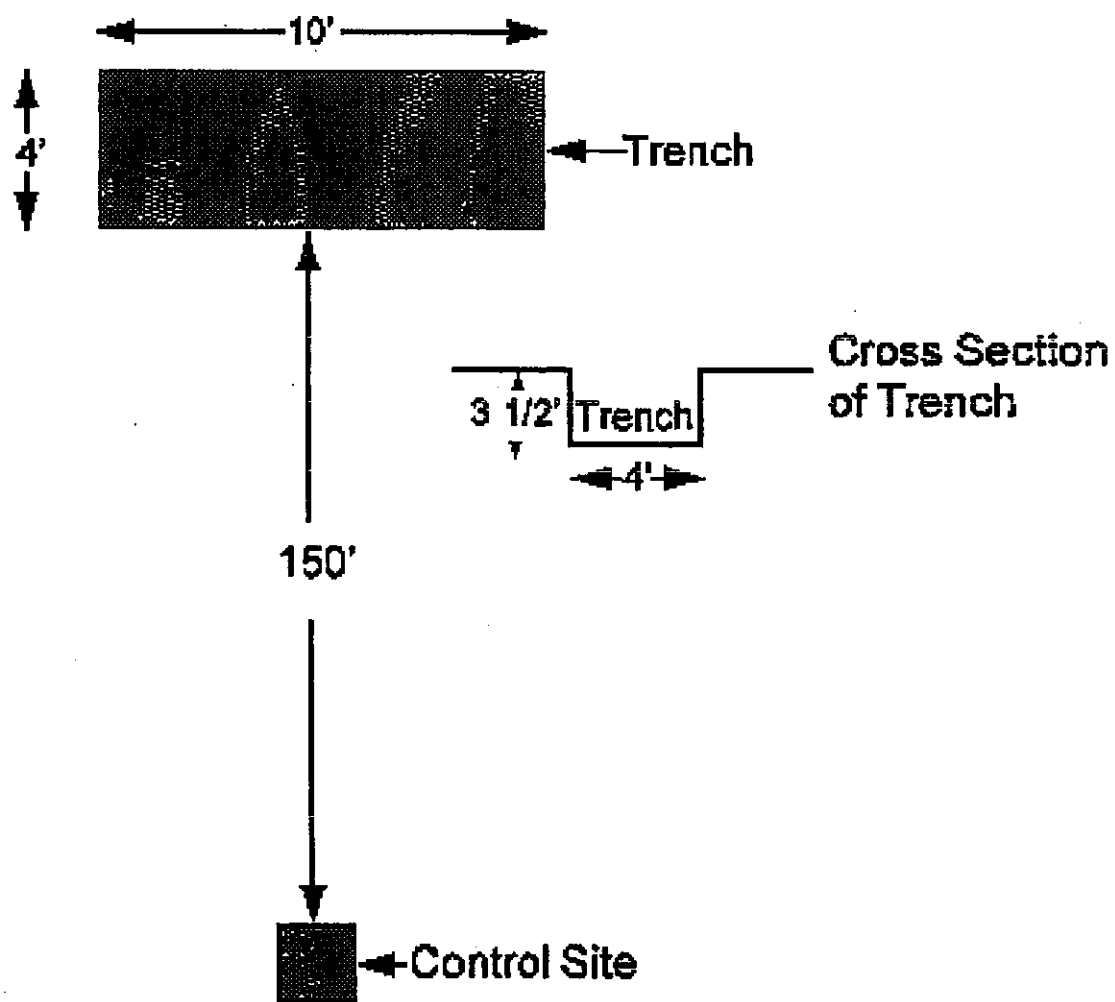


Fig. 5-3. Former Chemical Detonation Facility, 7822A.

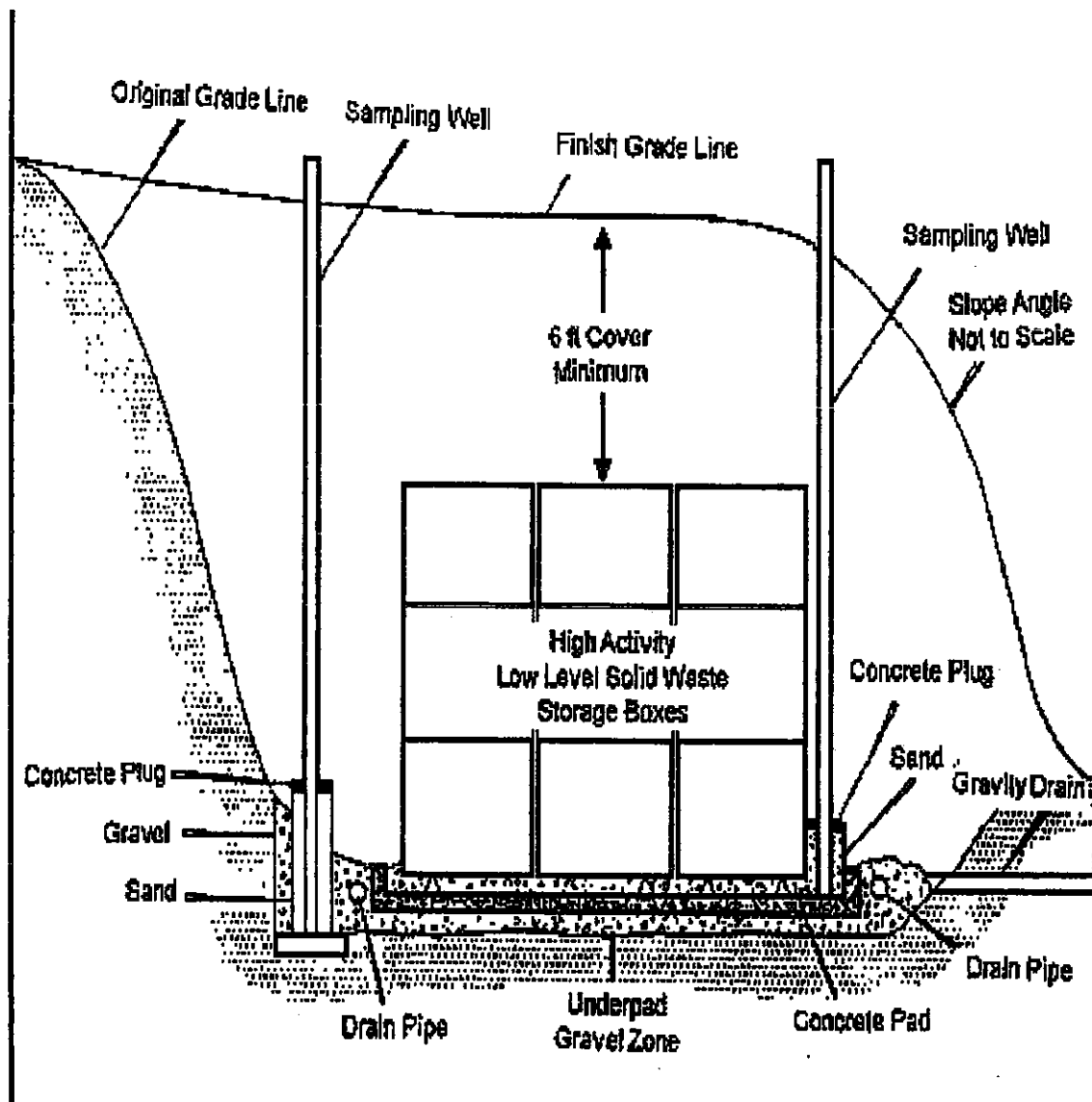


Fig. 5-4. Hillcut Test Facility, No Building Number Assigned.

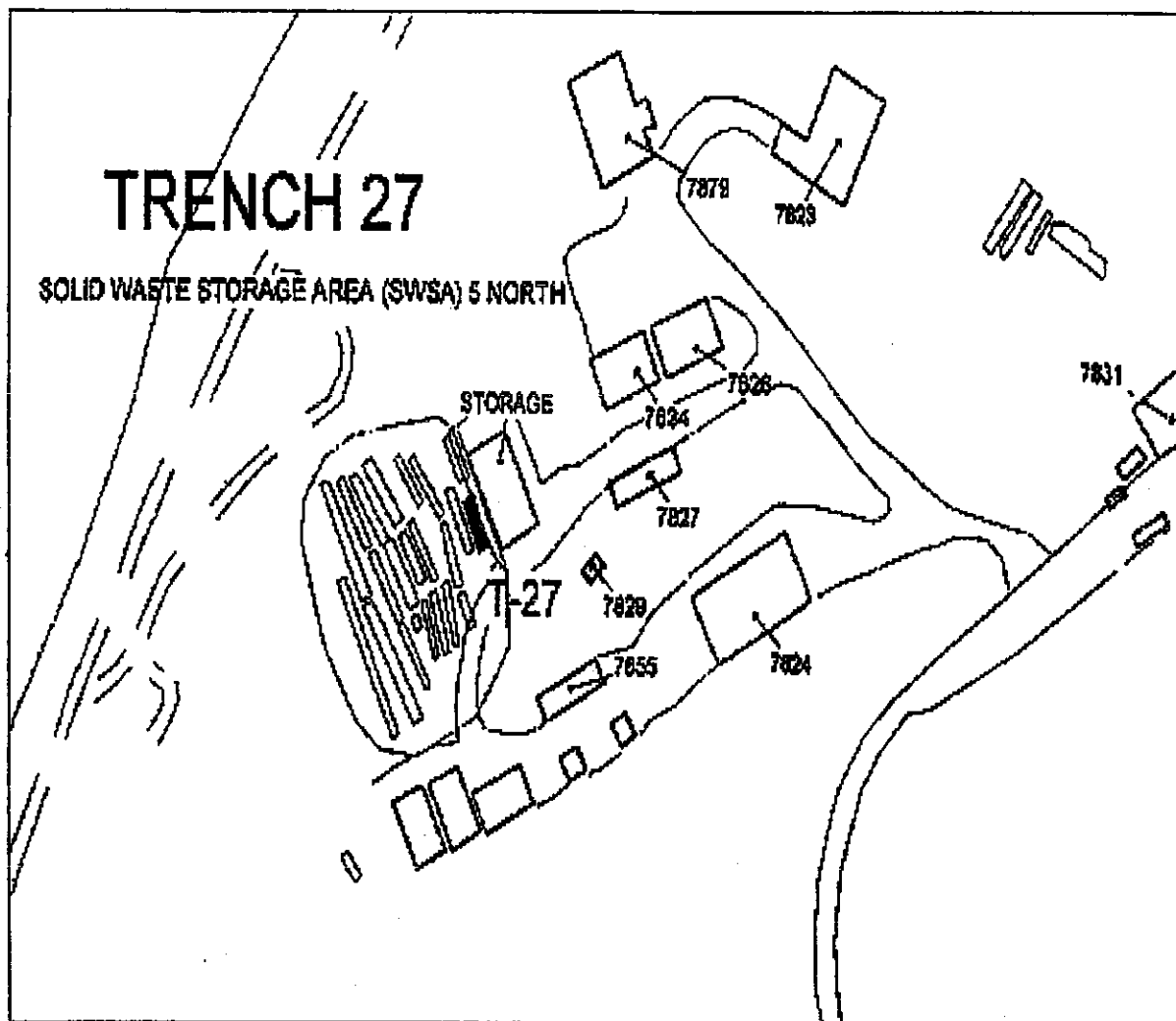


Fig. 5-5. SWSA 5 North, Trench 27, 7802N.

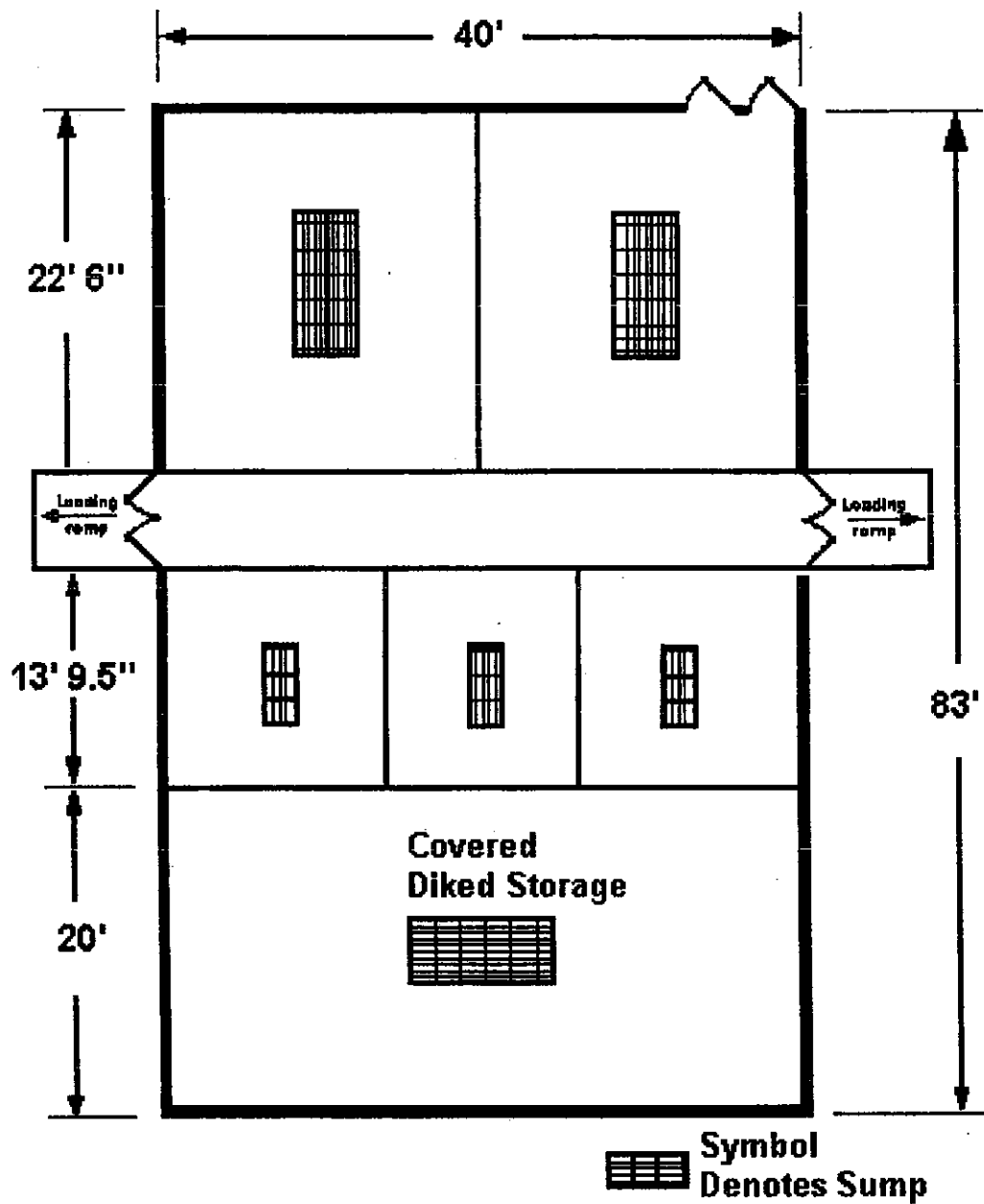


Fig. 5-6. Hazardous Waste Storage Facility, Building 7652.

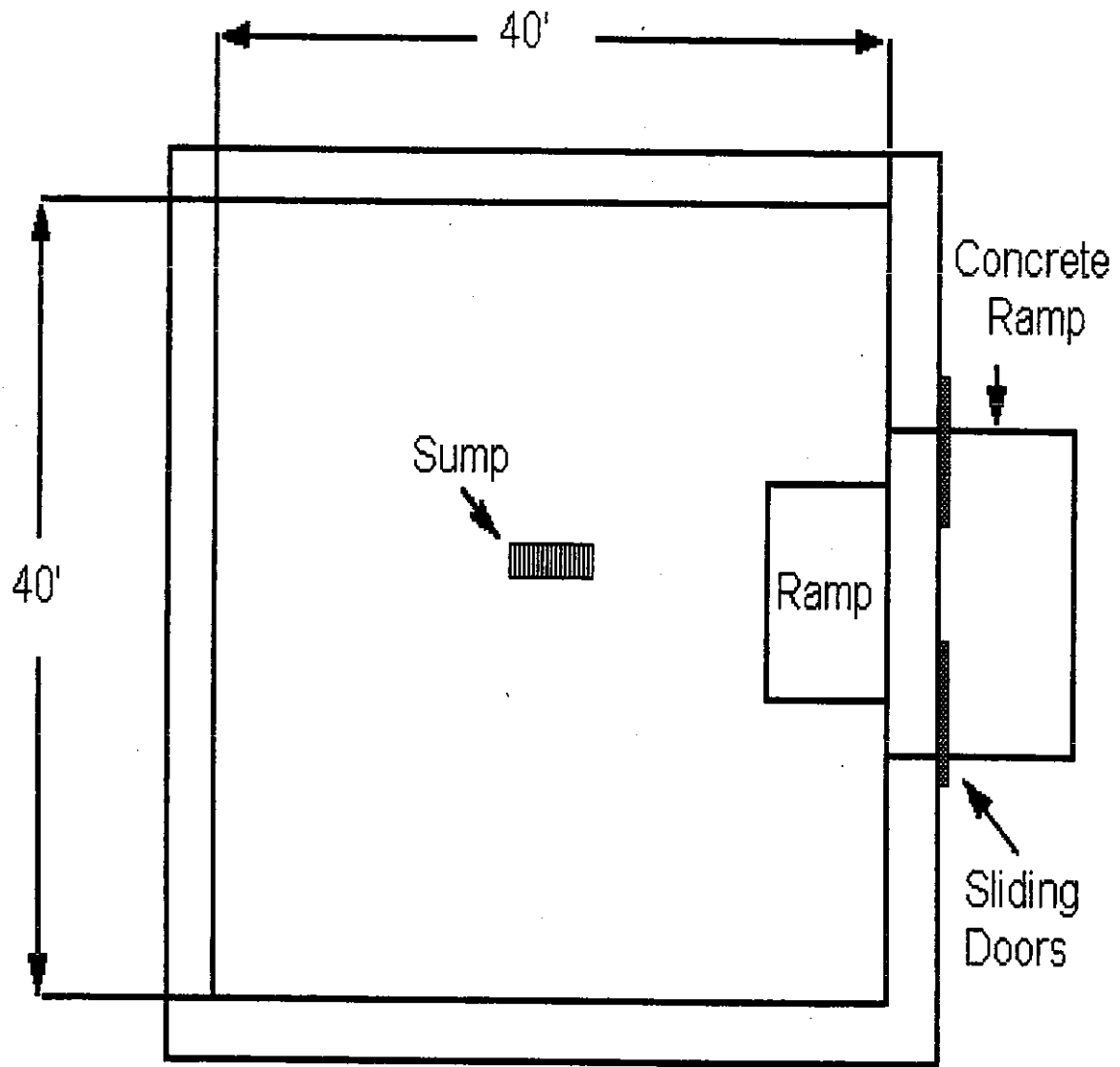


Fig. 5-7. Mixed Waste Drum Storage Facility, Building 7507W.

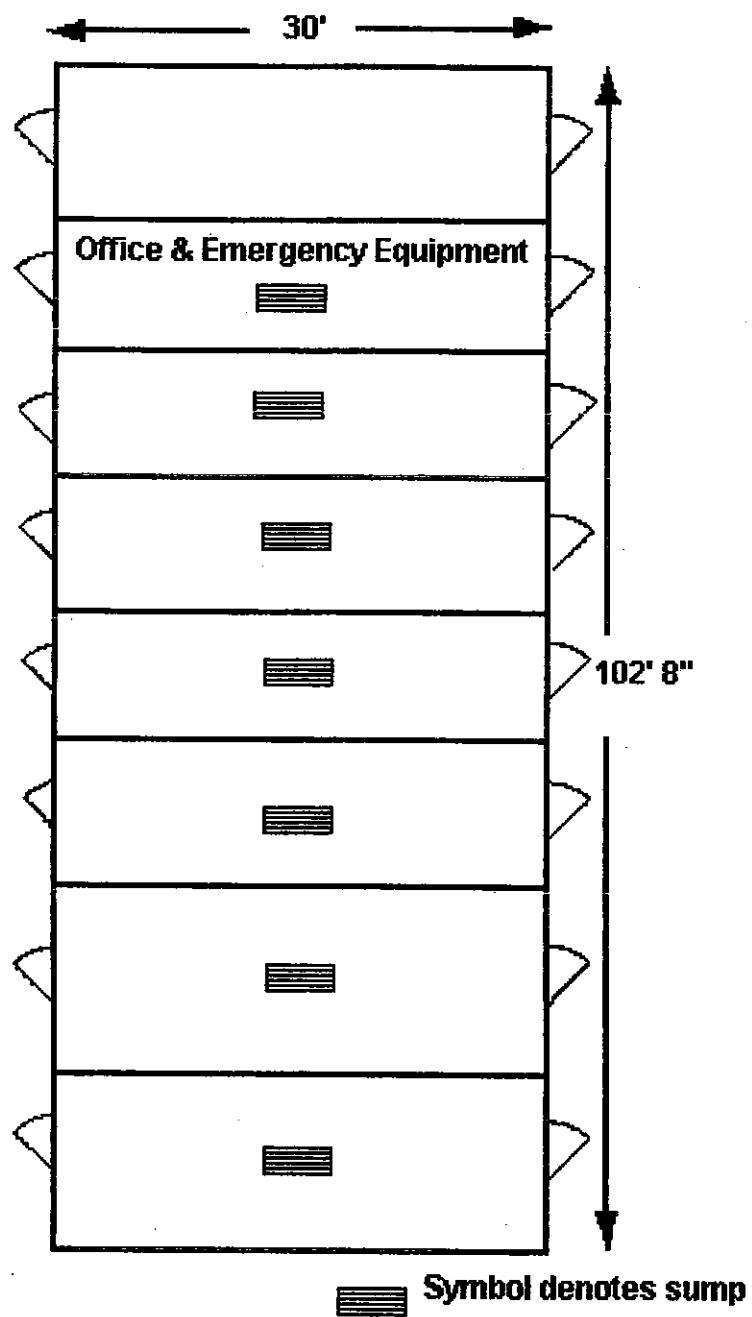


Fig. 5-8. Chemical Waste Storage Facility, Building 7653.

5-1-14

Class 2 Modification - Dated: 1/25/07

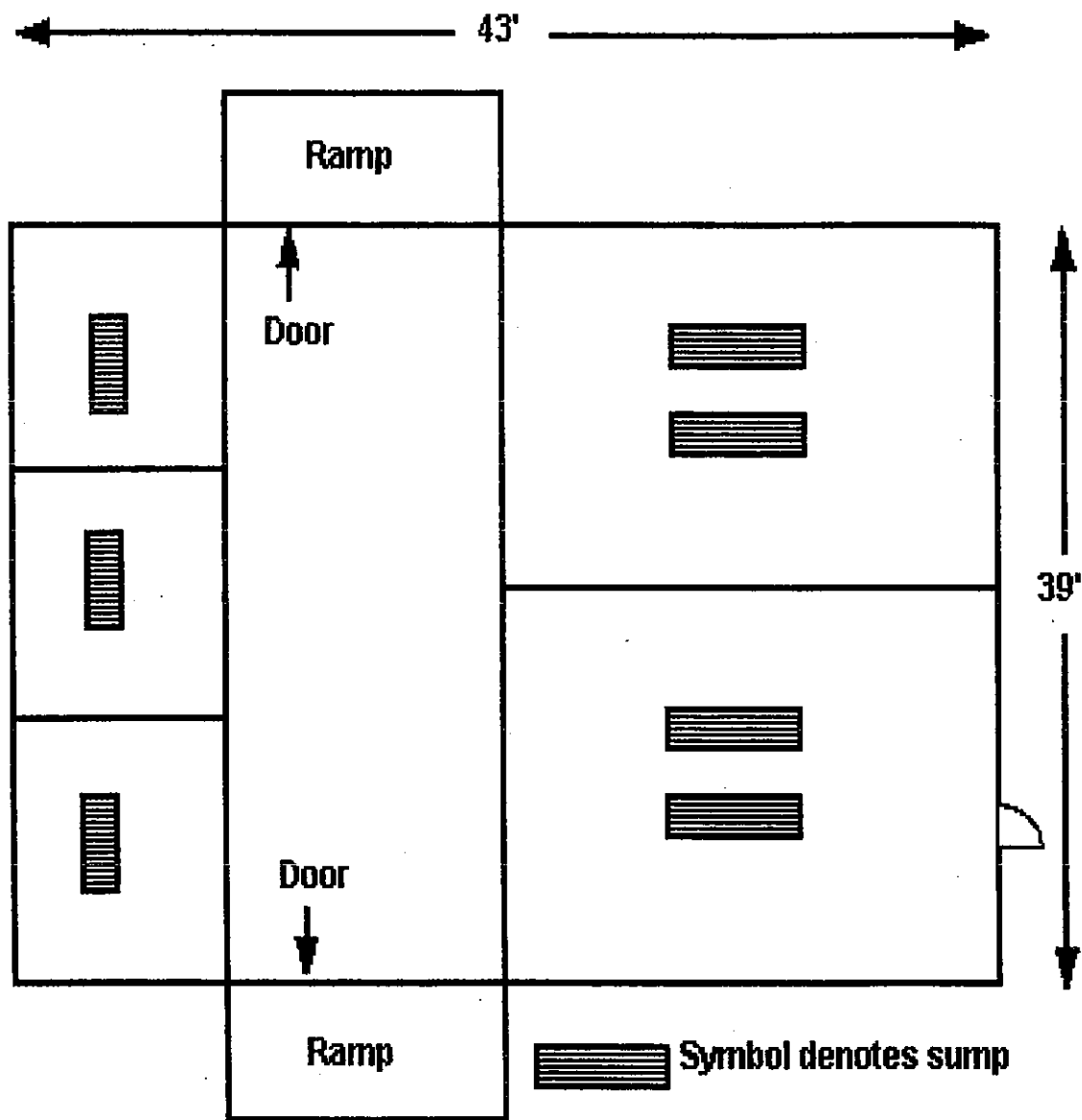


Fig. 5-9. Long-Term Hazardous Waste Storage Facility, Building 7654.

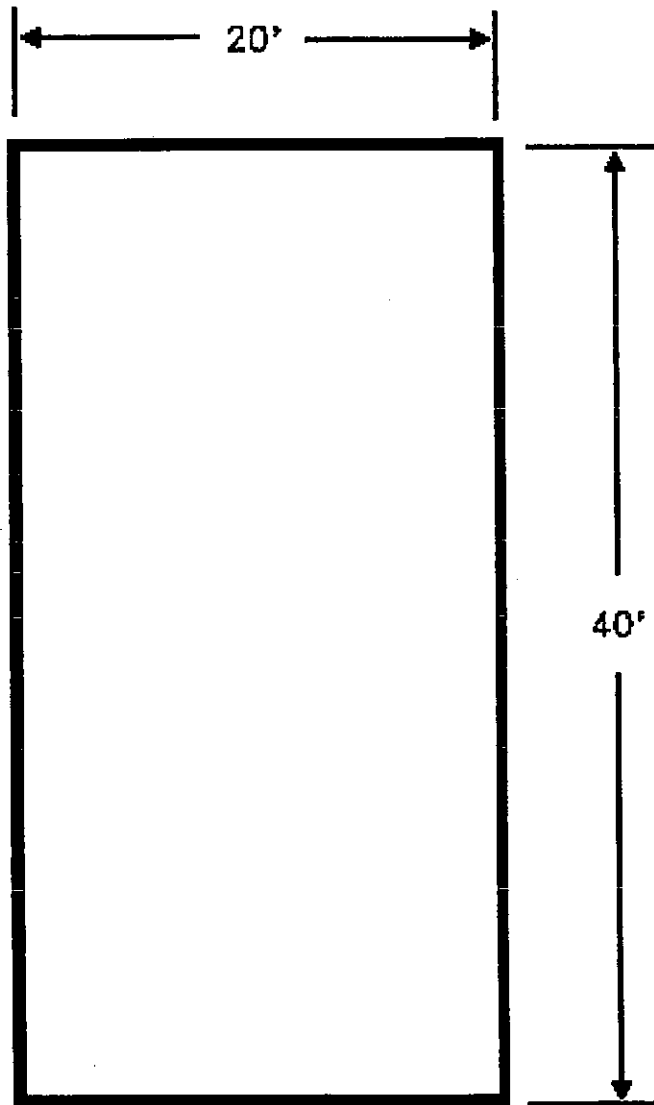


Fig. 5-10. Used Oil Storage Facility, Building 7651.

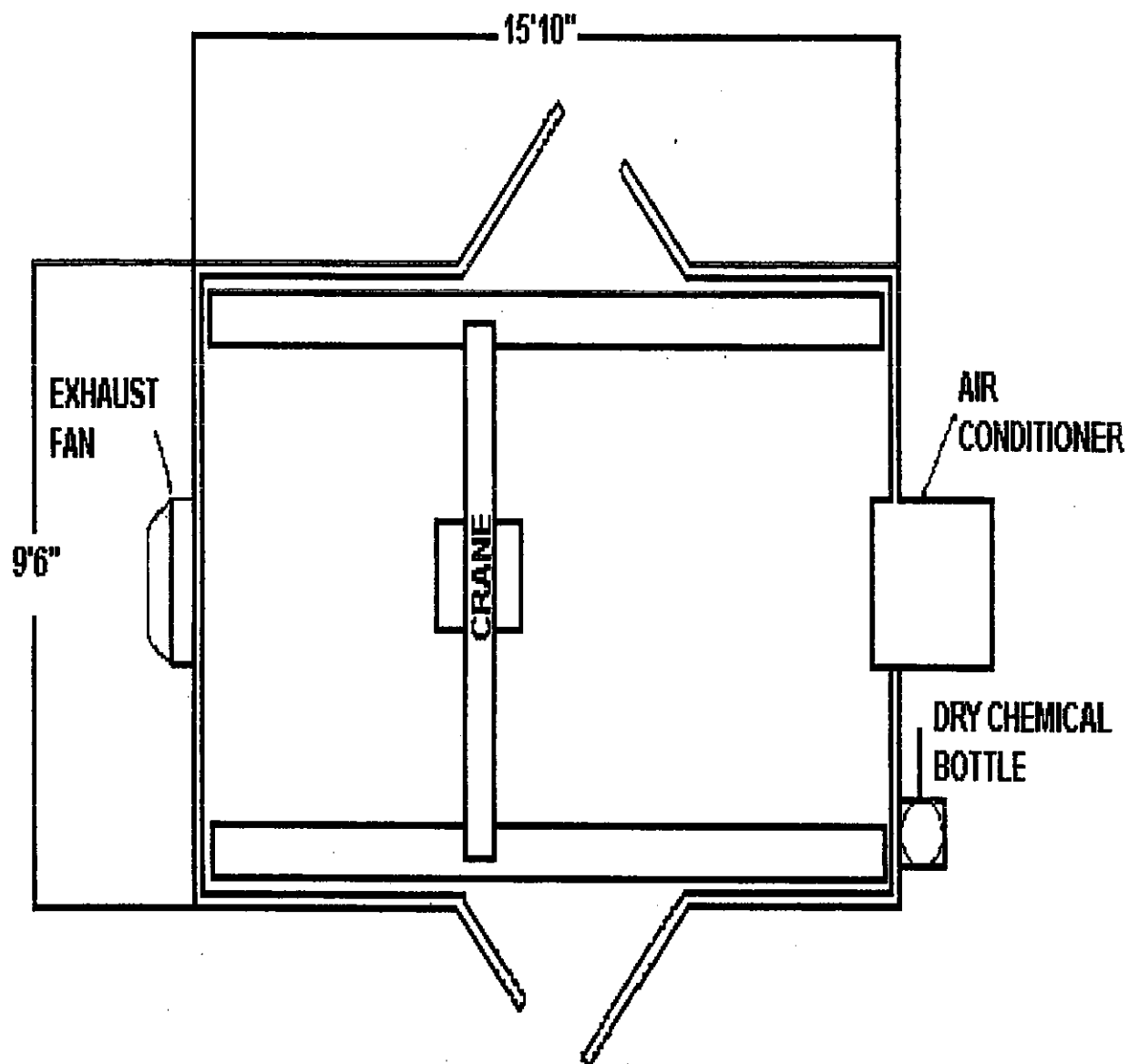


Fig. 5-11. Portable Sampling/Handling Units 1 and 2, No Building Numbers Assigned.

5-1-17

Class 2 Modification - Dated: 1/25/07

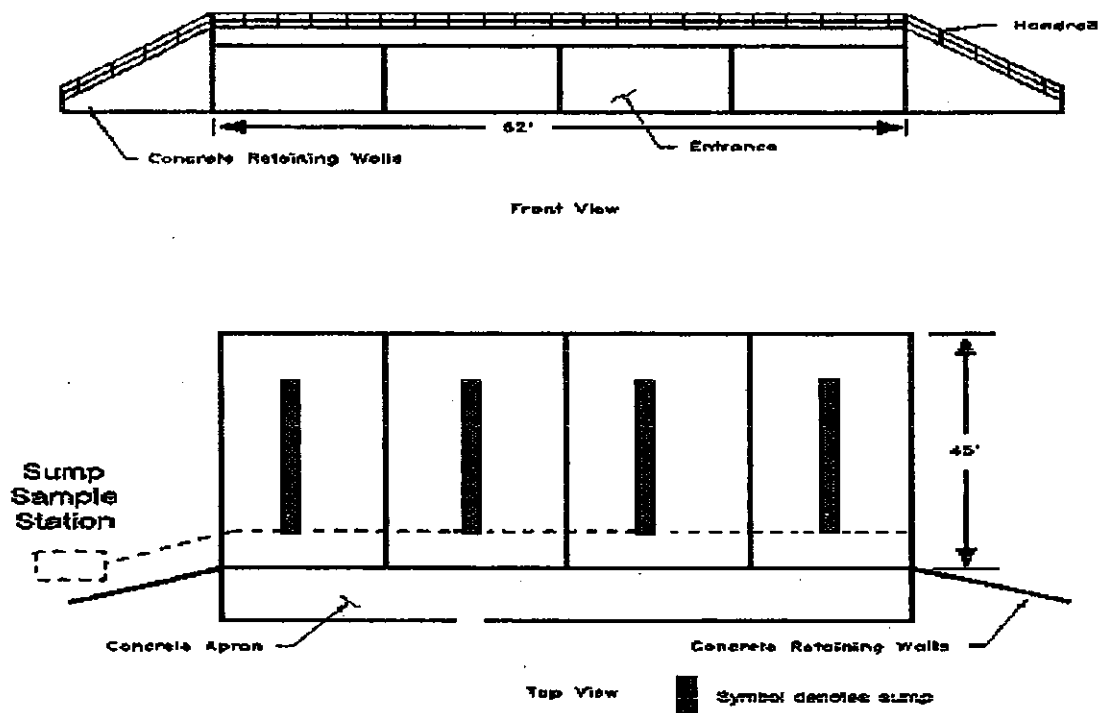


Fig. 5-12. RH-TRU Retrievable Concrete Storage Facility, Building 7855.

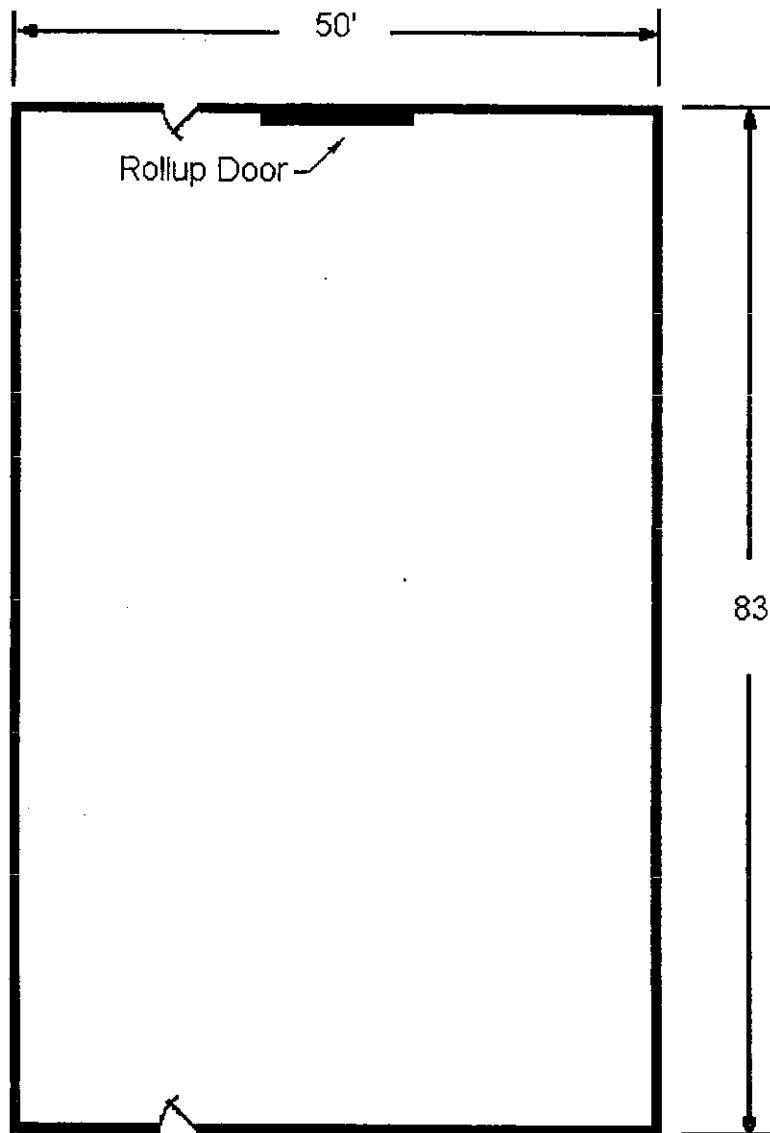


Fig. 5-13. NFS TRU Storage Facility, Building 7574.

5-1-19

Class 2 Modification - Dated: 1/25/07

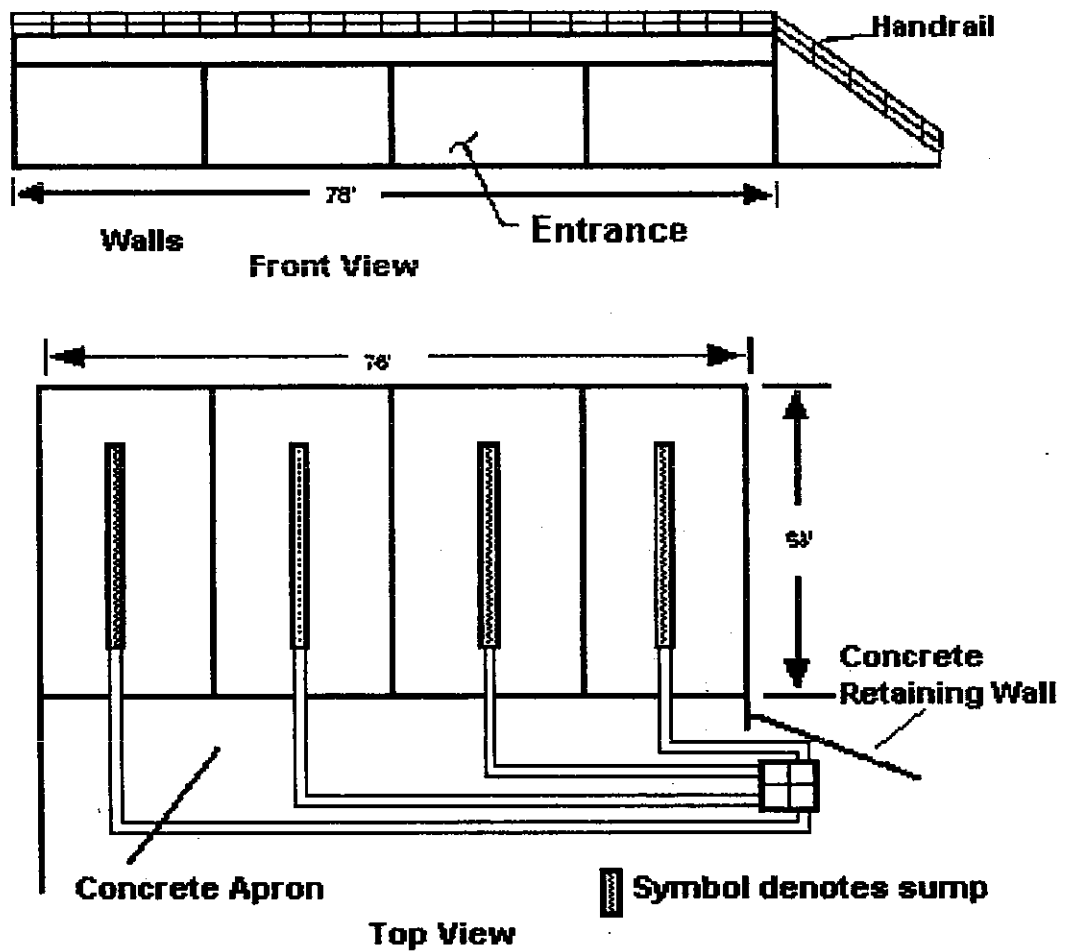
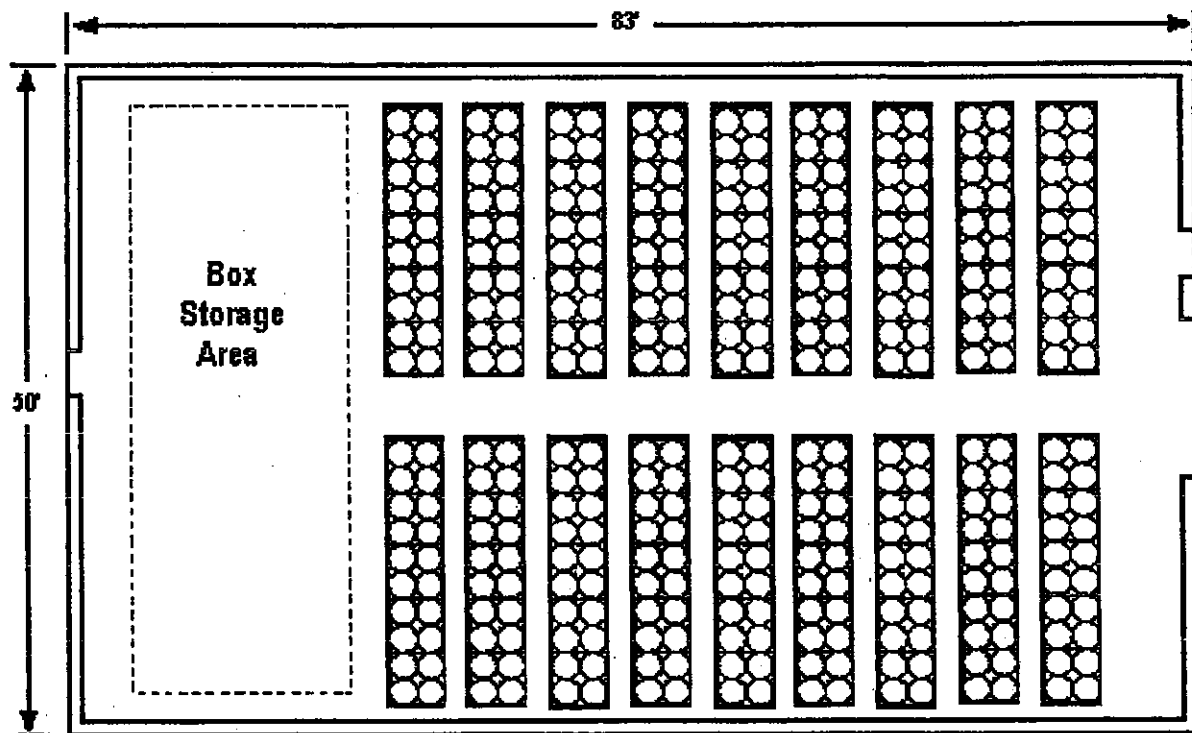


Fig. 5-14. RH-TRU Storage Bunker, Building 7883.



NOTE: Drums shown for illustrative purposes only.

Fig. 5-15. TRU/LLW Staging Facility, Building 7879.

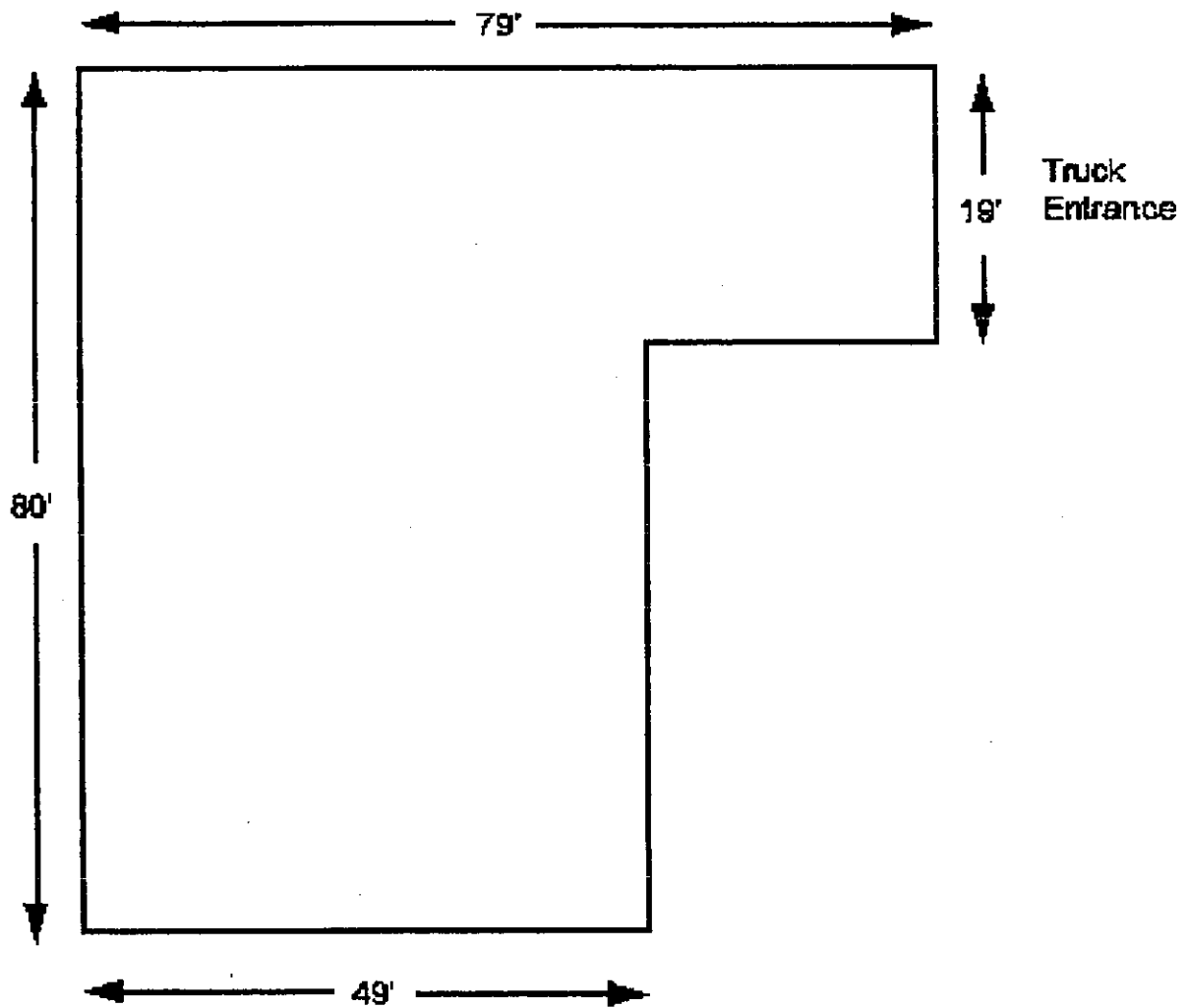


Fig. 5-16. CH-TRU Waste Storage Facility, Building 7823.

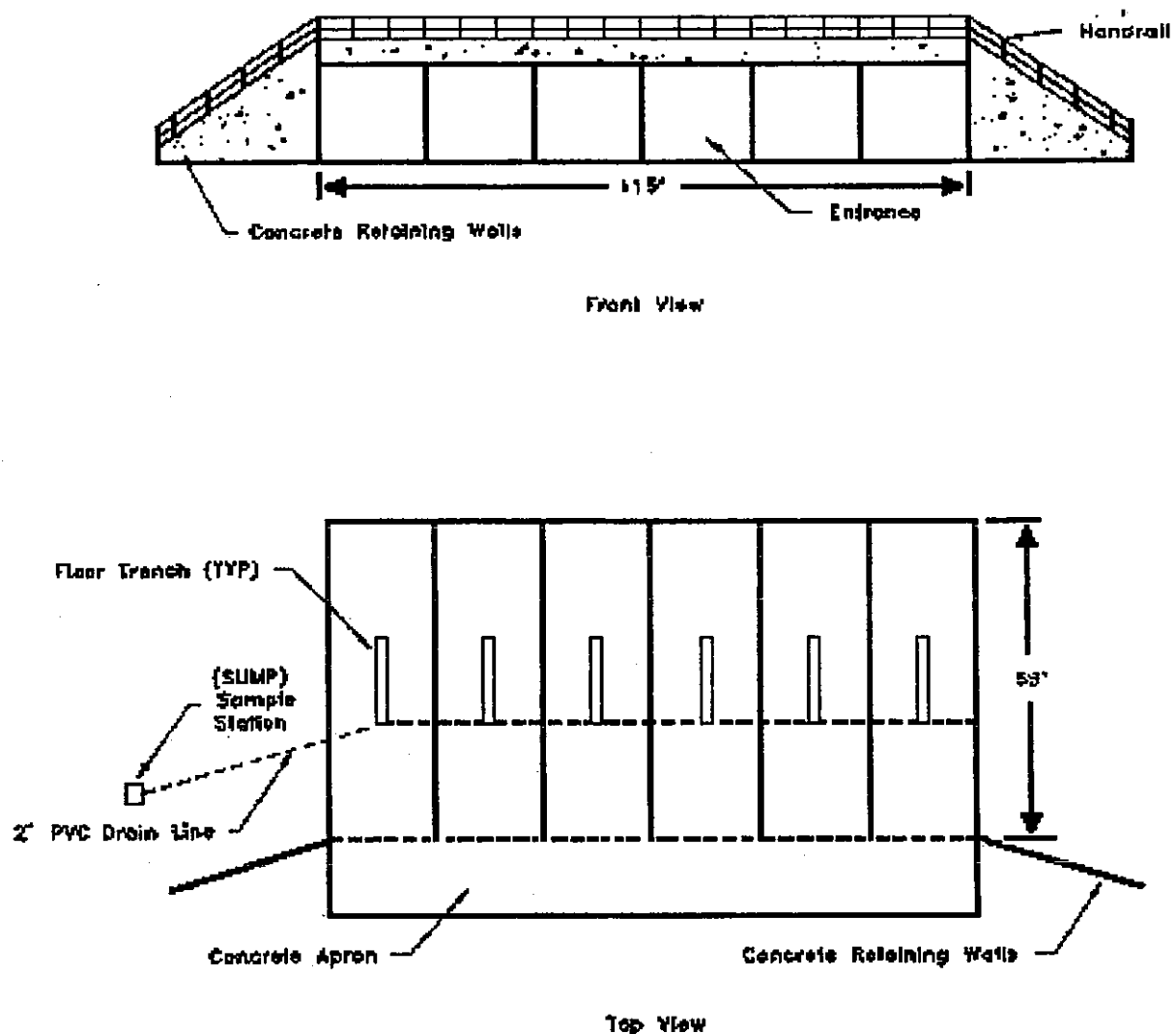


Fig. 5-17. (Proposed) RH-TRU Waste Storage Bunker, Building 7884.

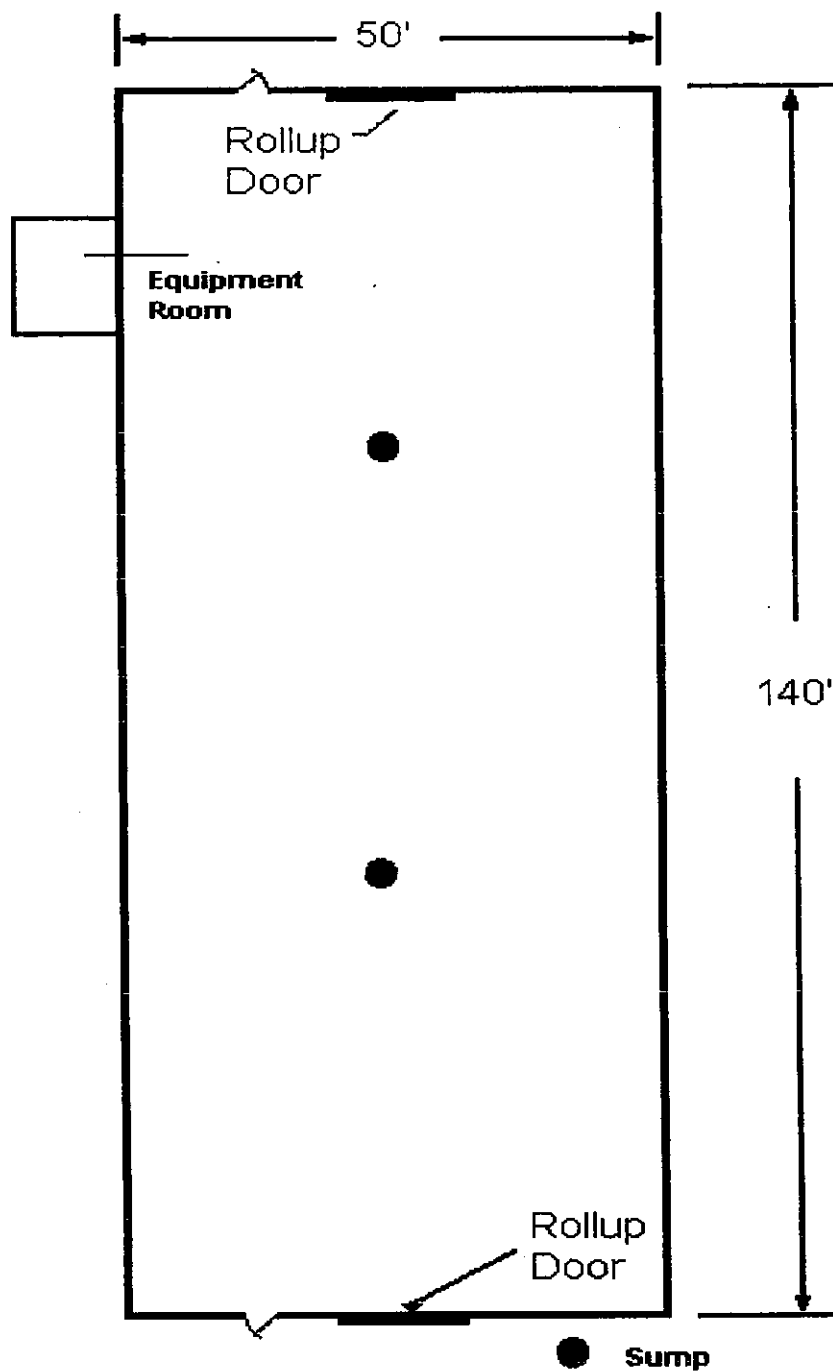


Fig. 5-18. CH-TRU Waste Storage Facility, Building 7572.

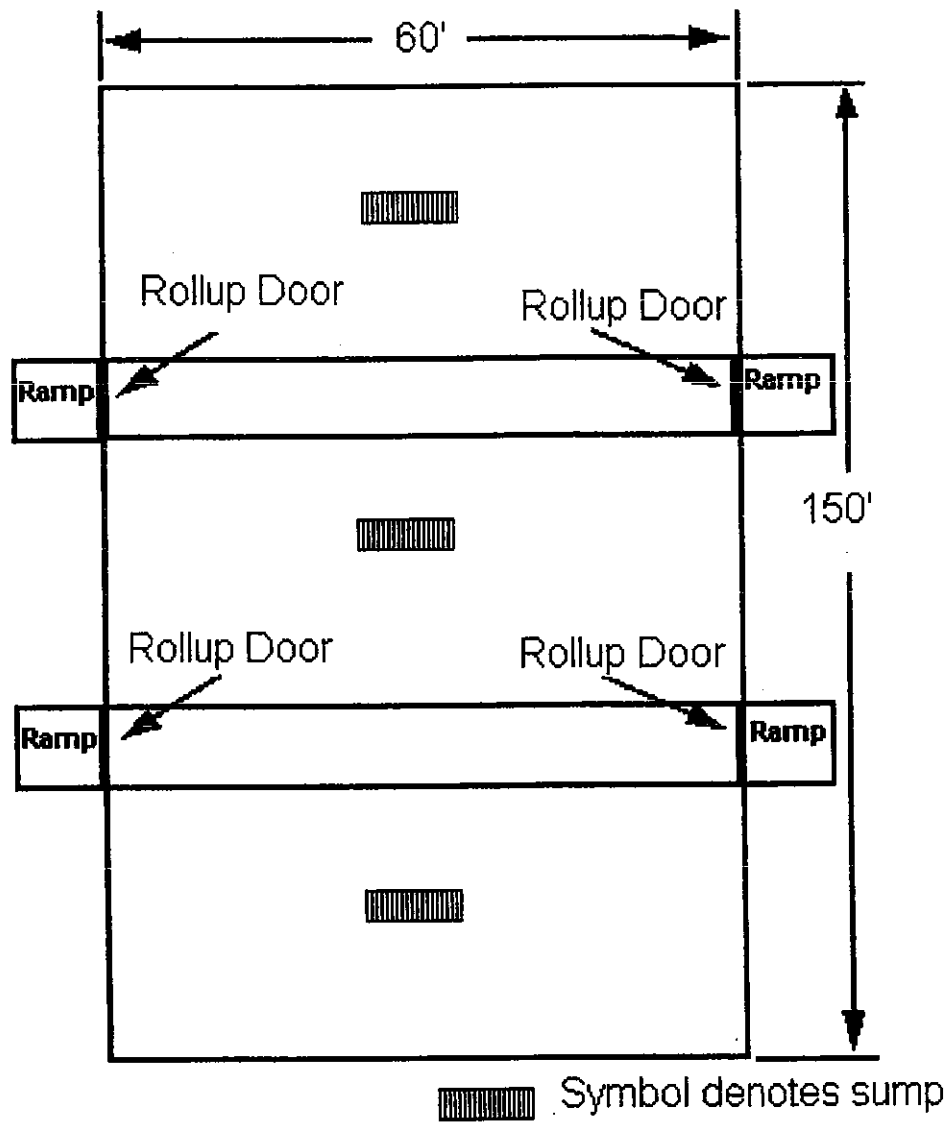


Fig. 5-19. (Proposed) TRU Storage Facility, Building 7577.

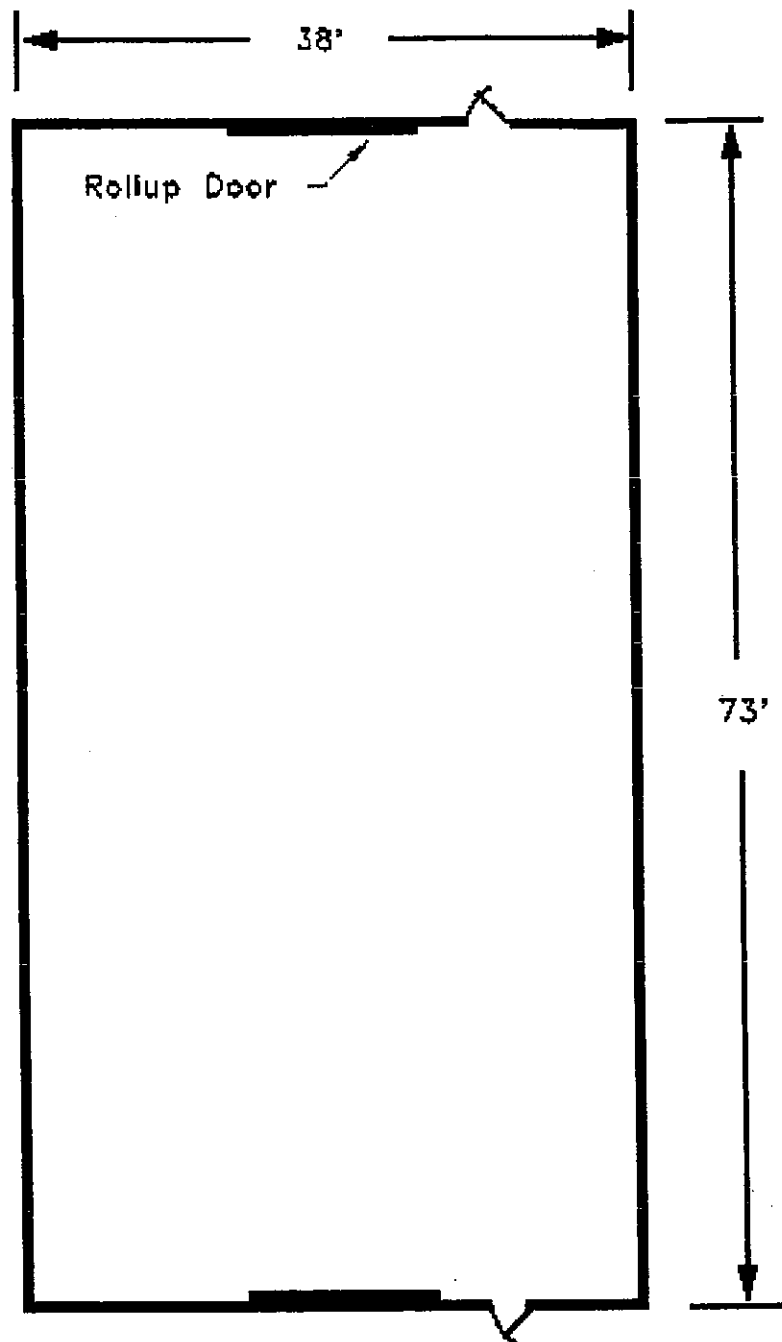


Fig. 5-20. SWSA 6 Staging Facility, Building 7878.

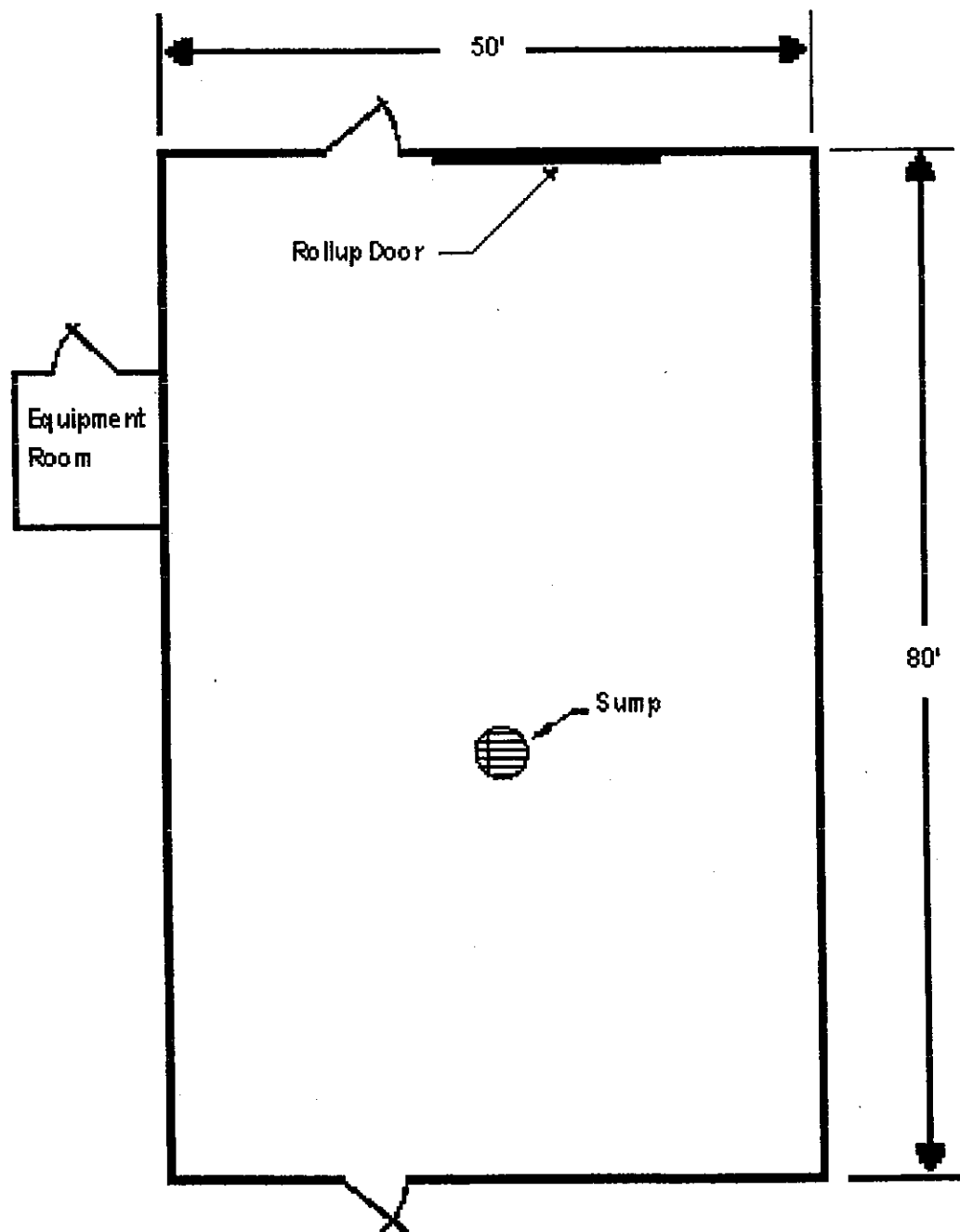


Fig. 5-21. (Proposed) Solid Low-Level Waste Storage Facility, Building 7580.

5-1-27

Class 2 Modification - Dated: 1/25/07

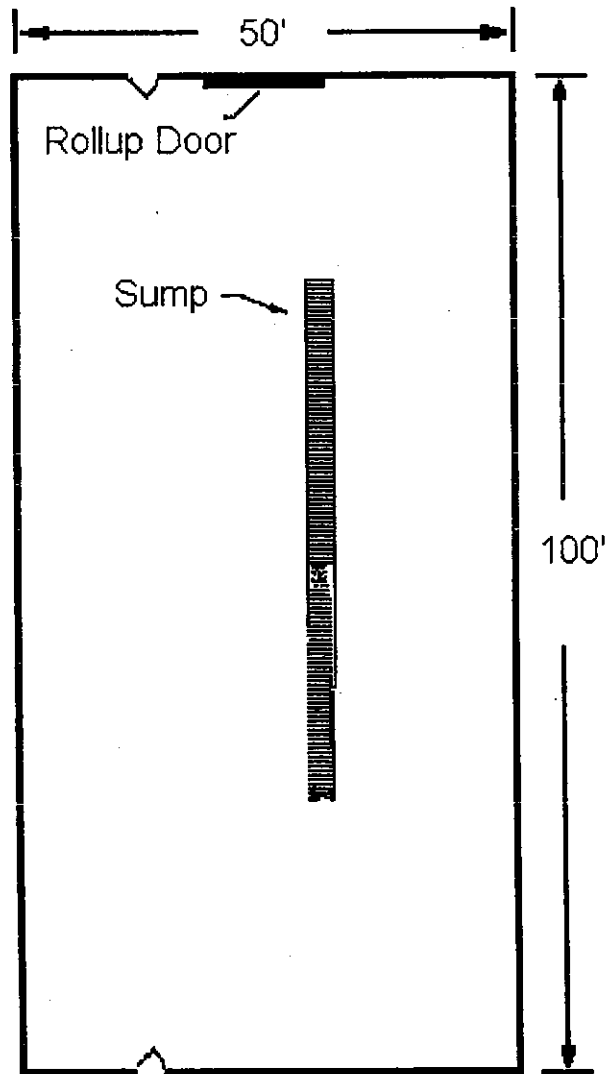


Fig. 5-22. (Proposed) Bulk Contaminated Soil Storage Facility, Building 7576.

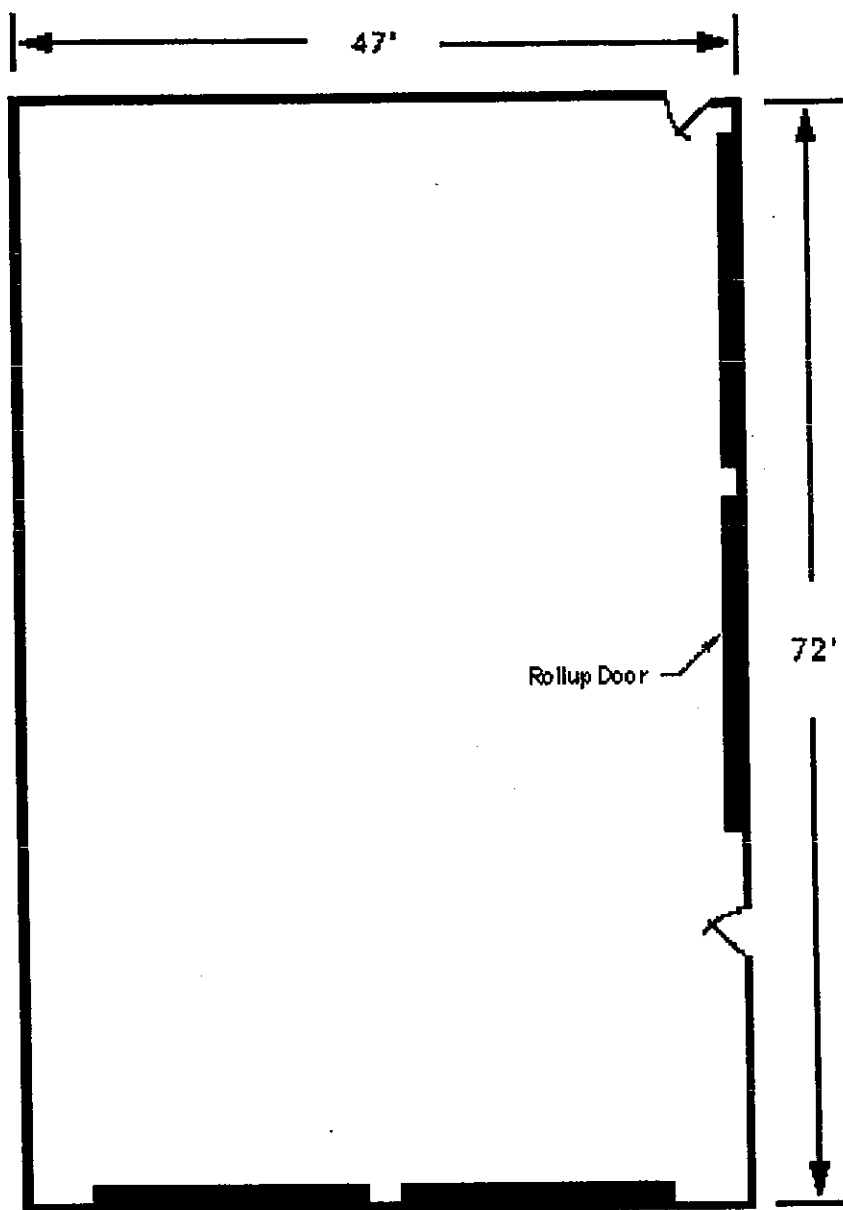


Fig. 5-23. SWSA 6 Waste Storage Facility, Building 7842.

5-1-29

Class 2 Modification - Dated: 1/25/07

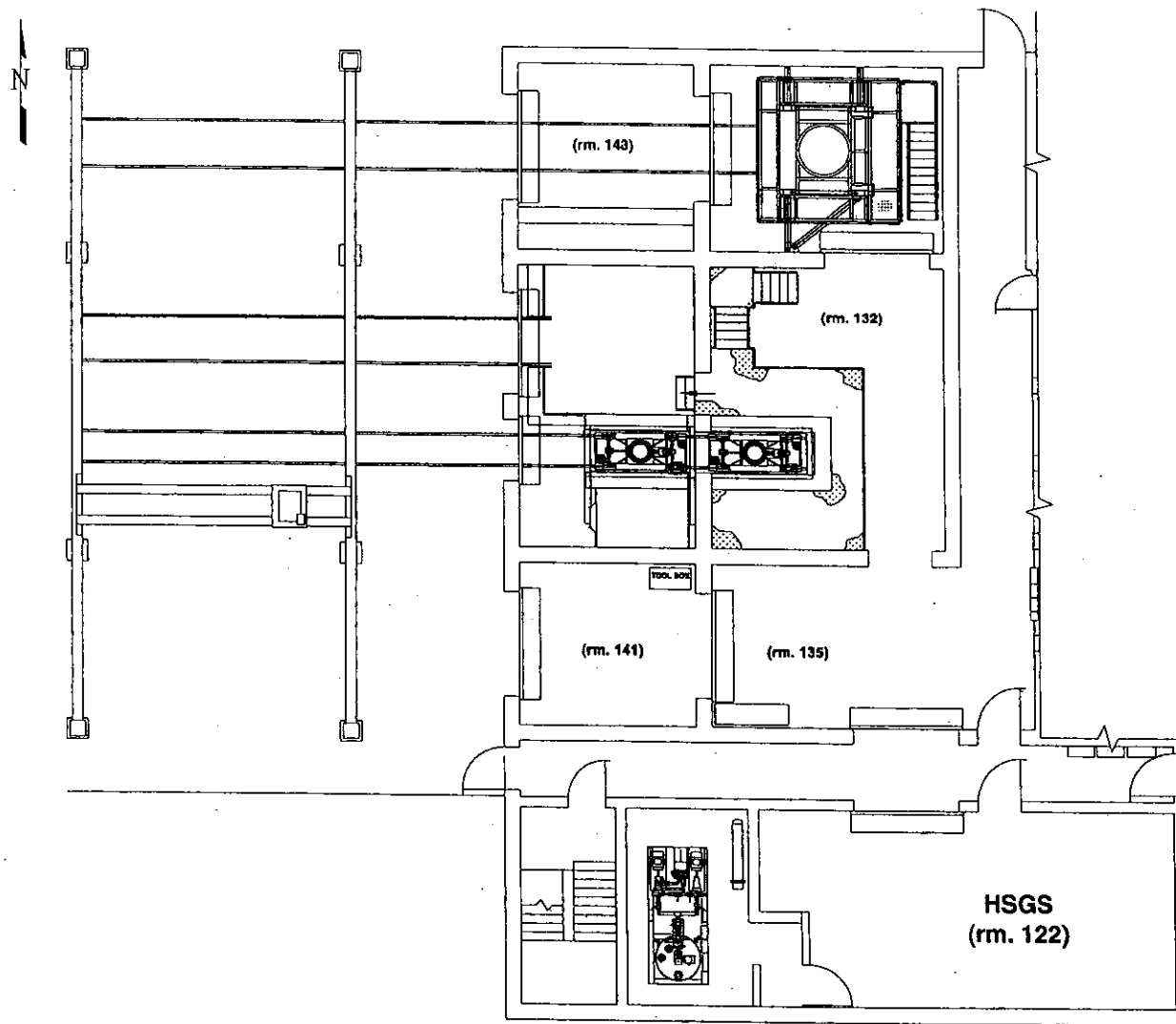


Fig. 5-24. WPF Waste Process Building 1st Floor.

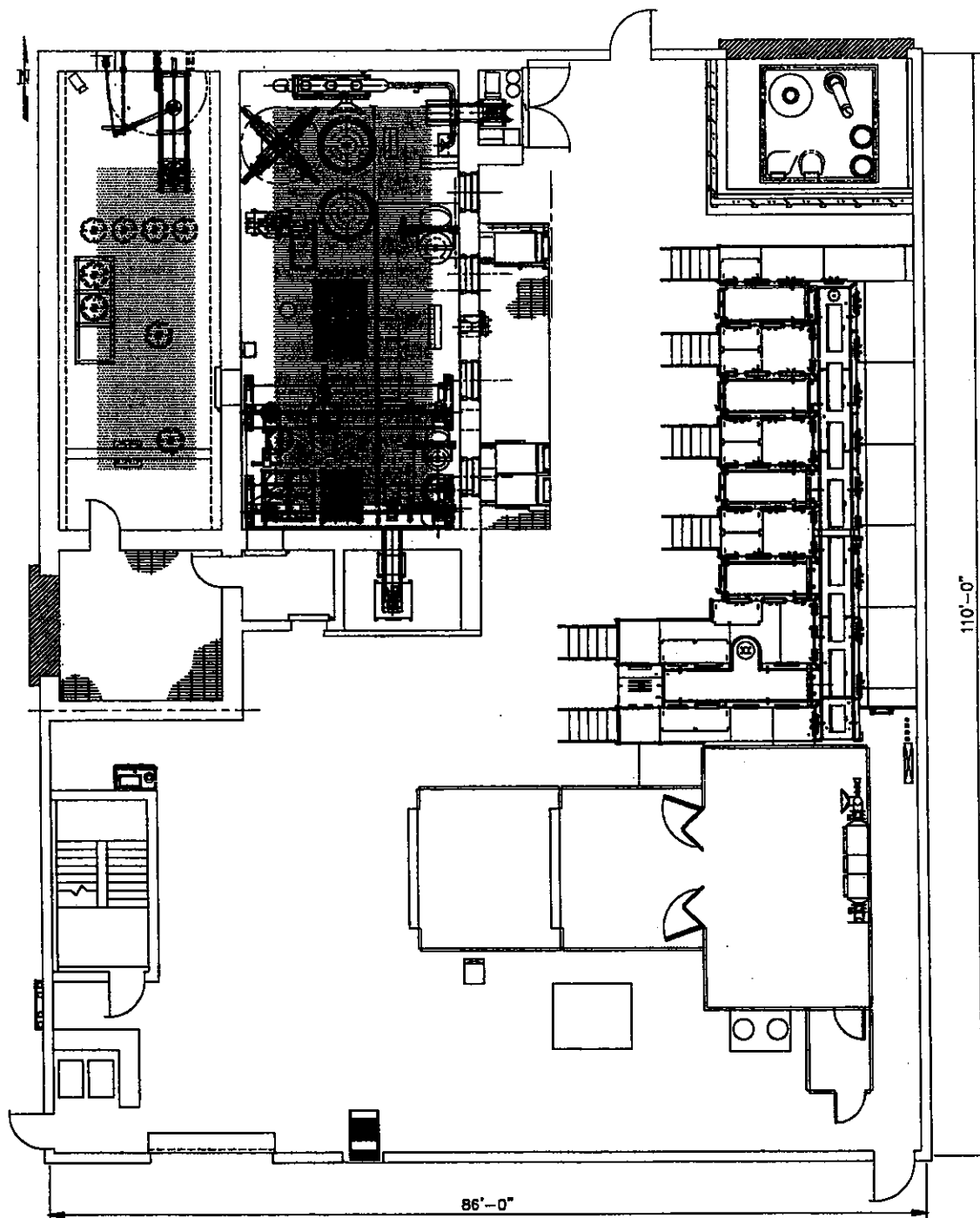


Fig. 5-25. WPF Waste Process Building 2nd Floor.

5-1-31

Class 2 Modification - Dated: 1/25/07

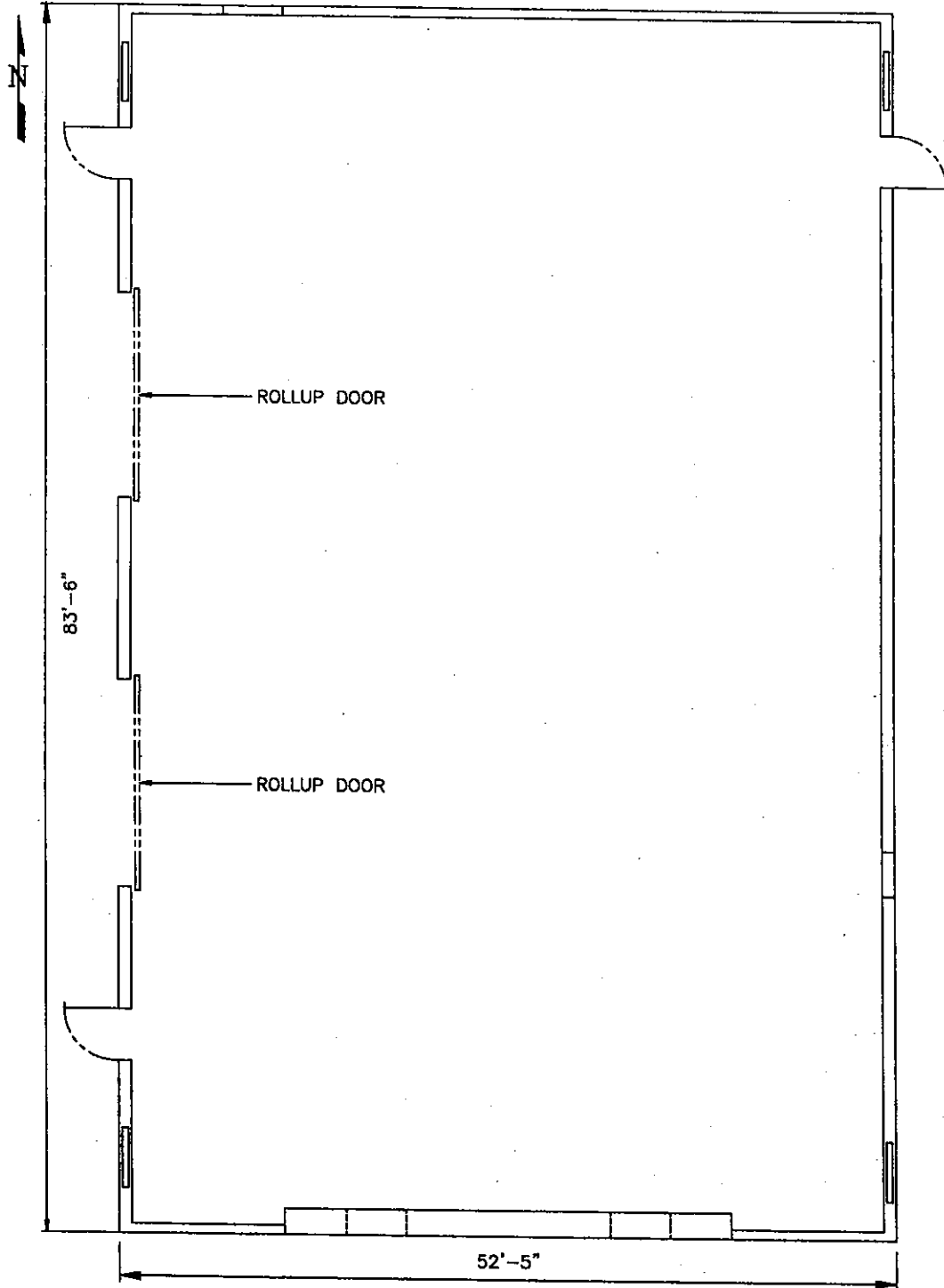


Fig. 5-26. WPF Contact Handled Staging Area (CHSA).

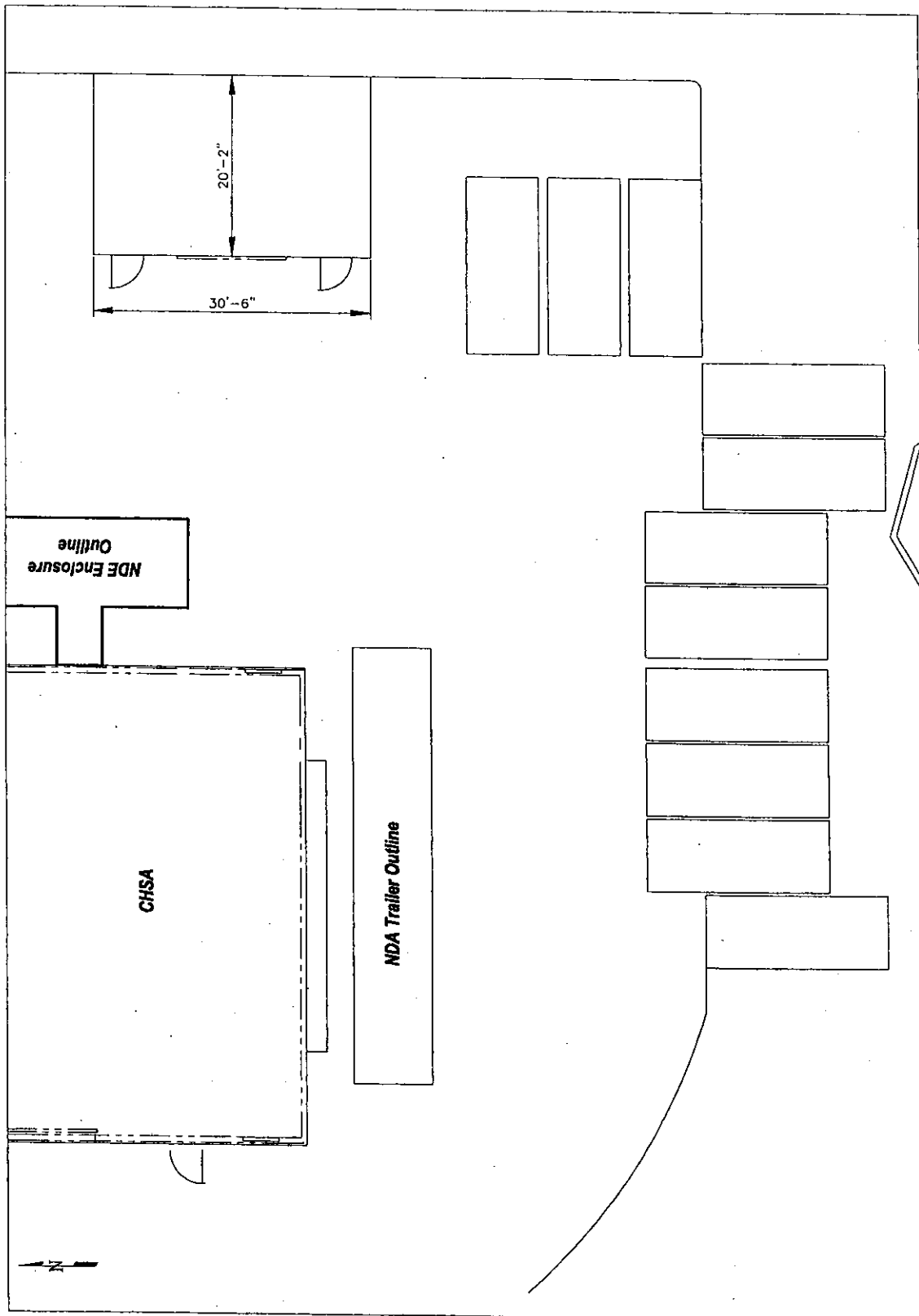


Fig. 5-27. WPF Container Storage Area (CSA).

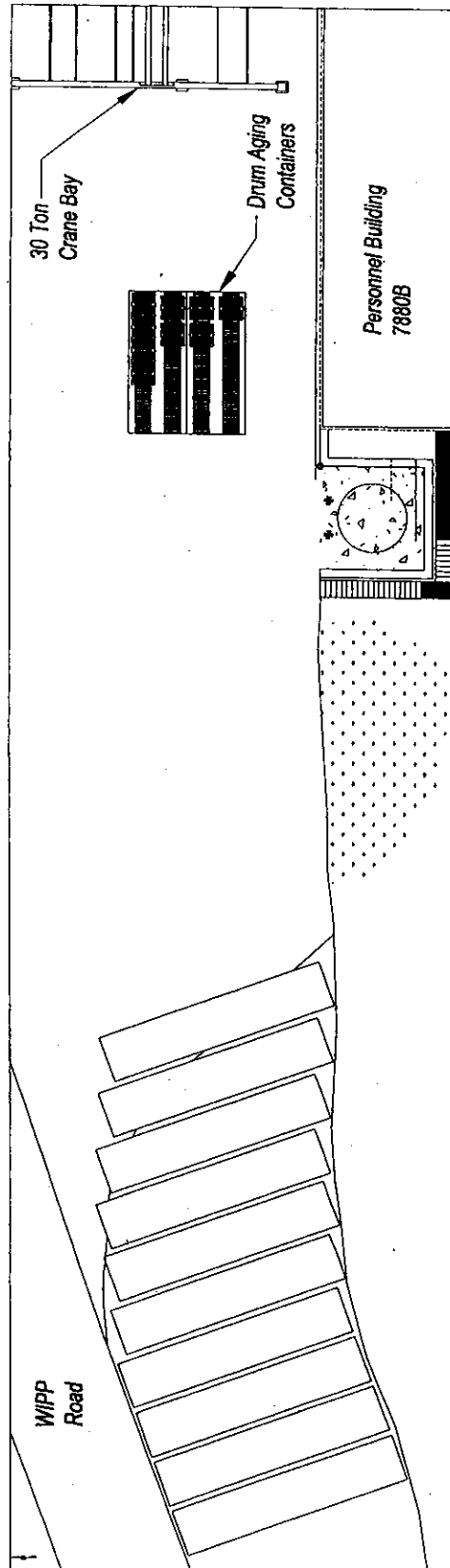


Fig. 5-28. WPF Drum Aging Criteria Area (DAC)

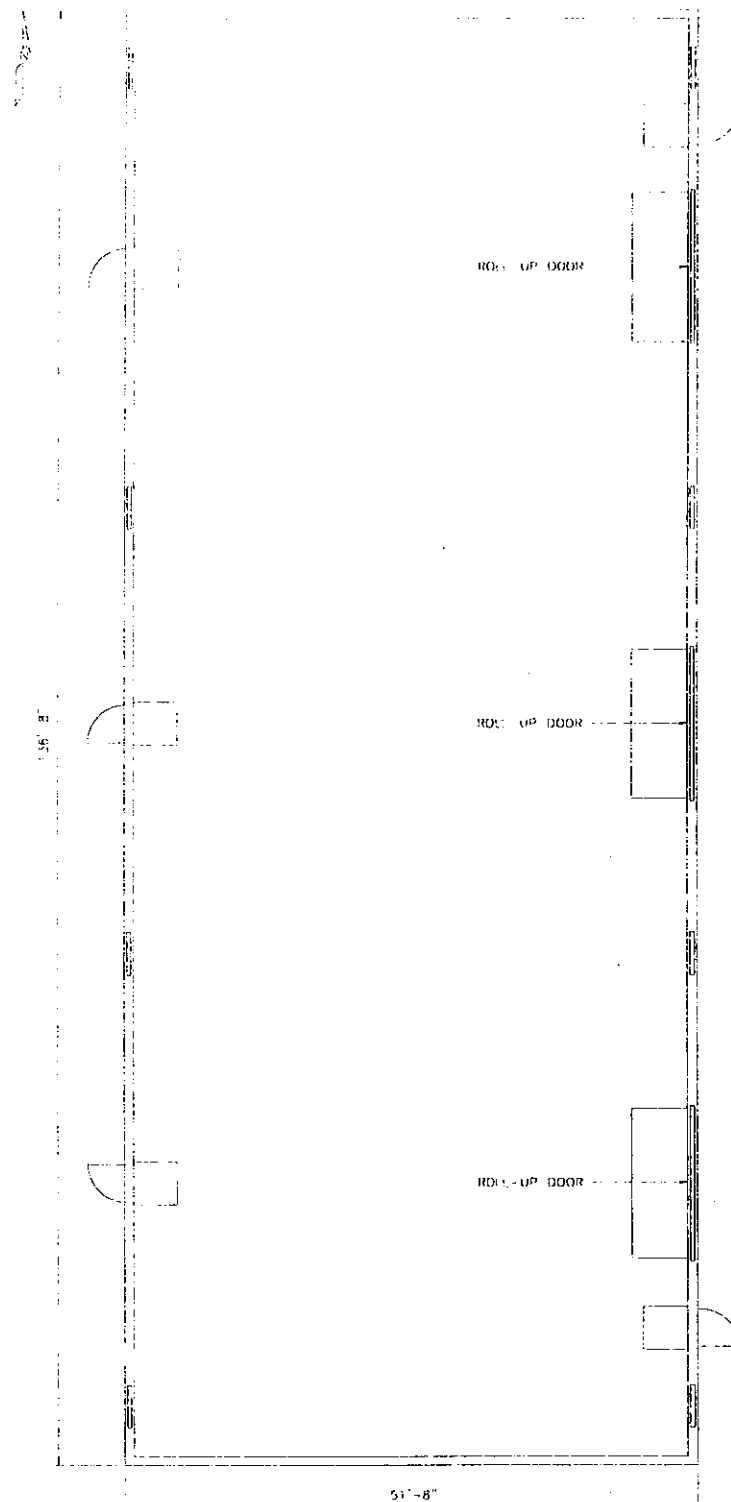


Fig. 5-29. Contact Handled Marshalling Building (CHMB)

APPENDIX 5-2

**SUMMARY OF EMERGENCY RESPONSE EQUIPMENT
AT THE HAZARDOUS AND MIXED WASTE STORAGE UNITS**

**SUMMARY OF EMERGENCY RESPONSE EQUIPMENT AT THE HAZARDOUS AND
MIXED WASTE STORAGE UNITS¹**

	Spill Kit ²	Overpack	Absorbent	Broom, Shovel	Gloves, Shoecovers, Goggles	Fire Extinguisher ³	Other
INTERIM STATUS							
7822							
7667						X ⁴	
7822A							
Hillcut Test Facility							X ⁵
7802N, SWSA-5 N, Trench 27							X ⁶
PERMIT TNHW- 010A							
7652		X	X	X	X	X	
7507W		X	X	X	X	X	
7653		X	X	X	X	X	
7654		X	X	X	X	X	
7651						X	
7669 ⁵		X	X	X	X	X	
Portable Sampling Units							X ⁶
PERMIT TNHW- 097							
7855							X ⁶
7574							X ⁶
7883							X ^{6, 7}
7879							X ⁶

SUMMARY OF EMERGENCY RESPONSE EQUIPMENT AT THE HAZARDOUS AND MIXED WASTE STORAGE UNITS¹

7823 (Mixed & CH)		X ⁹	X ⁹	X ⁹	X ⁹	X ⁹	X ⁶
7884							X ^{7, 8}
7572							X ^{6, 7}
7577							X ^{7, 8}
7878							X ⁵
7580							X ^{7, 8}
7576							X ^{7, 8}
7842							X ⁵
Waste Processing Facility (WPF)	X	X	X	X	X	X	

¹Building 3621 serves as the primary storage area for emergency response equipment.

²The following are examples of emergency equipment: 5-gal bucket, broom, shovel, absorbent, gloves, shoe covers, goggles/face shields/safety glasses.

³Or sprinkler system.

⁴Two fire extinguishers are stored at the Chemical Detonation Facility.

⁵A spill kit for this facility is stored in Building 7878A. Spill kit contains gloves, shoe covers, booms, and absorbent.

⁶For higher activity wastes (CH-TRU, RH-TRU, Class III/IV, etc.), additional emergency response equipment is stored in Building 7831. Examples of equipment are coveralls, shoe covers, gloves, respirators, etc.

⁷These units contain their own built-in fire suppression systems.

⁸When operational.

⁹Equipment is not required when wastes are stored in overpack containers lined with a minimum 6-mil polyethylene bag and are sufficiently impervious to contain leaks, spills, and accumulated precipitation and the capacity to contain 100 percent of the volume of the waste.

ATTACHMENT 6

CLOSURE, POST-CLOSURE, AND FINANCIAL REQUIREMENTS

6-1 CLOSURE PLANS

ORNL is a government facility owned and operated by DOE. ORNL (EPA ID No. TN1890090003) is located in both Bethel Valley and Melton Valley, approximately 8 miles southwest of Oak Ridge, Tennessee. ORNL is a multipurpose R&D facility that focuses on technology development of national importance, including the identification and development of solutions to complex problems in energy-based technologies such as materials development, separation techniques, chemical processes, biological screening, and biotechnology. ORNL research provides the data to make informed decisions concerning various energy technology options. Hazardous, mixed, and radioactive wastes are generated as a result of this research and research support operations. The WPF's function is to characterize, treat, and repackage, as necessary, the ORNL waste for off-site disposal.

This section addresses the closure of the RH-TRU Retrievable Concrete Cask Storage Facility (Building 7855), the RH-TRU Storage Bunker (Building 7883), the RH-TRU Waste Storage Bunker (Building 7884), the Staging Facility for CH-TRU Waste (Building 7823), the TRU/LLW Staging Facility (Building 7879), the CH-TRU Waste Storage Facility (Building 7572), the NFS TRU Storage Facility (Building 7574), the TRU Storage Facility (Building 7577), the SWSA 6 Waste Storage Facility (Building 7842 which has had waste removed and has been demolished and placed under SWSA 6 CERCLA cap as part of TDEC approved closure), the Bulk Contaminated Soil Storage Facility (Building 7576), the SLLW Staging Facility (Building 7580), the SWSA 6 Staging Facility (Building 7878 which has had waste removed and has been demolished and placed under SWSA 6 CERCLA cap as part of TDEC approved closure). These units are, or will be, located in the Melton Valley area of ORNL, including WAG 5, SWSA 6, and SWSA 7. The wastes and waste codes to be stored in the units are presented in Attachment 1, Table 1-1. Engineering drawings are provided in Appendix 7-1¹, and unit layouts are included in Attachment 5.

In the RH-TRU units, the presence of radiation and RCRA constituents (primarily metals such as lead, mercury, or cadmium) in the waste results in the classification of some of the waste as mixed. Other RCRA constituents (metals, solvents, etc.) could be present in either the RH-TRU wastes or the LLW stored in the RH-TRU units during their operational life.

In the CH-TRU units, the presence of radiation and RCRA constituents in some of the CH-TRU waste or LLW stored there results in the classification of those wastes as mixed. Potential RCRA wastes in those units include metals (lead, cadmium, mercury, etc.), sludges, aerosol cans, gas cylinders, and/or liquids (believed to be washwater), soils, waste oils, or solvents. The overall volume of RCRA materials relative to the volume of other components of the TRU waste is small.

¹ Engineering drawings of proposed units will be submitted as they become available and will be added to the permit as Class 1 modifications.

Closure of these units may be deferred to the Comprehensive Environmental Remediation, Compensation, and Liability Act (CERCLA) Removal Action (RA) Programs. The CERCLA RA (e.g., Decontamination & Decommissioning) will be performed in lieu of the RCRA Closure. Soil characterization, capping, etc. will be performed pursuant to CERCLA in lieu of RCRA Corrective Action. The RCRA substantive requirements and the closure performance standard are implemented as applicable or relevant and appropriate requirements (ARARs) under CERCLA; although, the administrative requirements are not applicable.

Units that are deferred to CERCLA shall be placed into standby and transitioned as RCRA Permitted units to the Surveillance and Maintenance or RA Program. Certification of completion of the CERCLA RA by an independent professional engineer is equivalent to the RCRA certification of closure and shall be submitted to TDEC as evidence for closure of the RCRA Permitted units under this Permit. Units that are not deferred to the CERCLA RA Programs will follow the closure steps in this plan. TDEC will be notified of the intent to close or deferral to CERCLA as described in the section "Schedule for Closure."

The TRU Waste Processing Facility (WPF) permitted units will be closed in accordance with the closure steps in this plan.

6-1a(1) Closure Performance Standard

This closure plan is designed to (1) ensure that the RH-TRU and CH-TRU will not require further maintenance and controls; (2) minimize or eliminate threats to human health and the environment; and (3) prevent the escape of hazardous waste, hazardous waste constituents, leachate, or waste decomposition products to the soil, ground, surface waters, groundwater, or the atmosphere upon ceasing operations. The closure plan complies with the closure requirements of 40 CFR 264 Subpart G, TN Rule 1200-1-11-.06(7), and the specific closure requirements for a storage unit under 40 CFR 264.178 and TN Rule 1200-1-11-.06(9).

The predominant potential environmental hazard associated with the mixed TRU¹ wastes stored in these units is radiological. The total volume of RCRA components in the waste will be minimal compared to the total volume of waste, and in most cases the RCRA hazard will be less than the radiological hazards. No residual contamination due to RCRA waste is expected to remain after closure of these units. However, the closure performance standard of this Part B permit application will meet or exceed RCRA requirements due to associated DOE procedures for handling mixed wastes and decontaminating and closing mixed-waste storage units.

All mixed waste will be removed from the RH-TRU and CH-TRU at closure and will be taken to another RCRA-permitted unit/facility for repackaging and certification. The low-activity LLW in the TRU units will be moved to another RCRA-permitted storage unit if LLW disposal is not possible. All TRU waste, including TRU mixed waste, must be certified to meet stringent WAC

¹ For Attachment 6, the terms TRU wastes will include the high-activity LLW that may be managed as TRU waste.

prior to off-site disposal at an approved RCRA facility such as the WIPP in New Mexico, the national repository for radioactive TRU waste. The disposal facility for the Class III/IV wastes has not been determined at this time.

Typical WAC requirements for WIPP equal or exceed RCRA requirements. For example, TRU waste shall not be in a free-liquid form, which is equivalent to a RCRA requirement for land disposal. If the waste cannot be accepted at WIPP, another approved facility will be selected. After the mixed waste containers have been removed, the units will be checked for radiological contamination to evaluate the possibility of reuse as a non-RCRA unit. Once the containers have been removed, the unit will be cleaned using methods appropriate to the wastes such as sweeping, scraping, steam cleaning, washing, or scrubbing. Samples will then be taken to determine if hazardous constituents at RCRA-regulated levels [40 CFR 261.24 as incorporated by reference in TN Rule 1200-1-11-.02(2)(a)1] remain. If contamination is found, a second decontamination step will be conducted, and sampling for those RCRA-regulated constituents (see below) found during the initial sampling phase will be performed.

A representative number of samples from each contaminated area/storage bay within the unit will be collected using wet swipe (over a 100 cm² area). The swipes will then be analyzed for total metals and/or organics (see under Method 1311, EPA SW-846). Testing will be based on an evaluation of the hazardous constituents stored in the units and the spill records for each of the units. The level of total metals and/or organics will be divided by 20 to approximate the quantity that would leach under the Toxicity Characteristic Leaching Procedure (TCLP). The resulting value will be compared to the regulatory limit listed in Table 1 of 40 CFR 261.24 as incorporated by reference in TN Rule 1200-1-11-.02(3)(a)1 to determine whether additional decontamination and retesting using the TCLP should be conducted. Further decontamination will be undertaken if the calculated value is within 95% of the regulatory limit. Analytical and field quality assurance/quality control will be implemented as required in the organization SOPs and EPA SW-846. The units covered in this document will be decontaminated, if necessary, to meet DOE-approved radiation levels for reuse as non-RCRA units. Contamination of surrounding soils and groundwater is not expected; however, if found, the site will be considered for inclusion in the Federal Facility Agreement for the Oak Ridge Reservation and remediated in accordance with the overall site remediation plan. If radioactive decontamination of the unit is necessary, decontamination for hazardous constituents will also be considered by evaluating RCRA parameters in the rinse water.

As stated in this plan, the WPF hazardous waste management units will be decontaminated at the time the Facility is decommissioned and residues will be appropriately disposed off-site, leaving no post-closure requirements or further maintenance. The closure plan is designed to remove the waste processing facilities and radiological and hazardous residues, returning the site to equal or better than pre-existing conditions. The following sections discuss the efforts to be made at the site to satisfy the closure requirements in Tennessee Rule 1200-1-11-.06(7).

6-1a(2) Notice of Intent to Close

At the end of the operating life of these facilities, or whenever it becomes necessary to partially close one or more of these facilities, the Commissioner of the TDEC will be notified, in writing, or by facsimile, of the date that closure of the unit is to begin. This notification will be submitted to the Commissioner at least 45 days before closure is to begin, unless otherwise agreed upon by the Commissioner or the Commissioner's representative. The permittee will provide

justification for closure of the unit(s) under CERCLA instead of RCRA and must receive approval from the Commissioner of TDEC prior to such closure. For units to be deferred to the CERCLA Program, the Notice of Intent to Close will serve as notification to TDEC 45 days prior to initiating RA under the CERCLA Program.

6-1b Partial Closure and Final Closure Activities

As described in Attachment 3, units, or portions of units, covered by this permit may be considered in "standby" mode when not storing hazardous or mixed waste. Standby mode does not trigger closure as described in this attachment. The individual units in this document will not undergo partial closure. However, the 13 units will not be closed at the same time, which may be considered partial closure. All TRU wastes, including mixed waste, will be transported off-site to WIPP or another approved disposal unit. The low-activity LLW will be sent to an approved storage or disposal unit. After closure, these units may be reused for non-RCRA activities.

A copy of the approved closure plan will be kept at or near the unit(s) undergoing closure as part of the unit's operating record until final closure has been completed and approved by the appropriate regulatory authorities. This will include all revisions to the plans. The closure of the units storing TRU wastes will necessitate extended closure schedules. The basis for the extensions is discussed in Section 6-1a.

6-1c Maximum Waste Inventory

The maximum waste inventory of each of the waste storage units covered in this document is listed in Table 6-1. These waste inventory calculations have been updated to reflect the most current projected unit dimensions and projected waste storage operations but are subject to change because some of the proposed units are in the conceptual design phase. Closure procedures for the units are described in Section 6-1e.

6-1d Schedule for Closure

The overall schedule and basic steps for closure are summarized in Table 6-2 and 6-3 for the WPF.

RH-TRU Units/Wastes. Casks will be removed from the buildings at an estimated rate of two casks per month. If full, Buildings 7855 and 7883 will require 54 months for cask removal. Building 7884, if full, will require 81 months for cask removal. The estimated removal rate is based on the expected operational capacity of the waste repackaging unit(s) to repackage the wastes in the casks and to certify the repackaged wastes for transport to an off-site facility, such as the WIPP. To comply with the schedule in I-1d(1), closure may be initiated as the unit is nearly emptied of wastes. Formal closure will be initiated for Buildings 7855 in approximately 2016 and for Buildings 7883 and 7884 in approximately 20 years after operations begin. The initial cleaning and decontamination will be completed in approximately one month. Sampling and analysis to verify that residual contamination is not present at the unit will require approximately three months to complete. Subsequent cleaning and decontamination is not anticipated but, if required, would be completed in one month. Verification sampling and analysis will be completed in approximately two months.

6-4

Class 1 Modification, Dated: 10/29/02
Temporary Authorization – Dated: 3/6/06
Class 2 Modification - Dated: 1/25/07

CH-TRU Units/Wastes. Closure will be initiated approximately 20 years from the permit date or operation date, whichever is later. Waste removal from each of the CH-TRU units will require three to six months.

The initial cleaning and decontamination will be completed in approximately one month. Sampling and analysis to verify that residual contamination is not present at the unit will require approximately three months to complete. Subsequent cleaning and decontamination is not anticipated but, if required, would be completed in one month. Verification sampling and analysis will be completed in approximately two months.

Table 6-1. Maximum waste inventory

Building number	Maximum waste inventory (gal)
7855	96,433
7883	96,433
7884	144,517
7823	89,586
7879	114,708
7572	220,000
7574	94,800
7577	219,632
7842 ¹	94,800
7576	245,000
7580	68,000
7878 ²	75,840
WPF Waste Processing Facility (including six storage areas)	168,300 ³

¹7842 has had waste removed and has been demolished and placed under SWSA 6 CERCLA cap as part of TDEC approved closure.

²7878 has had waste removed and has been demolished and placed under SWSA 6 CERCLA cap as part of TDEC approved closure.

³The WPF units are not used for long-term storage of hazardous/mixed waste. They are only used for staging of mixed wastes from the other units at ORNL in support of preparing waste for off-site disposal.

TABLE 6-2. CLOSURE SCHEDULE

Closure Procedures	RH-TRU 7855 7883	Units/Wastes 7884	CH-TRU Units/Wastes 7823 7879 7574 7580 7842 7878	7572 7577 7576	Mixed LLW in CH-TRU Units ¹	WPF Units including CH and RH
Receipt of closure plan approved	0	0	0	0	0	0
Equipment mobilization	0.5 months	0.5 months	0.5 months	0.5 months	0.5 months	0.5 months
Waste removal ²						
Maximum:	54 months	81 months	3 months	6 months	1 month	3 months
Minimum:	1 month	1 month	1 month	1 month	1 month	1 month
Initial	1 month	1 month	1 month	1 month	1 month	1 month
Decontamination	3 months	3 months	3 months	3 months	2 months	3 months
Sampling and Analysis	1 month	1 month	1 month	1 month	0.5 months	1 month
Decontamination	2 months	2 months	2 months	2 months	1.5 months	2 months
Verification, sampling and Analysis						
Total Time						
Maximum:	61.5 months	88.5 months	10.5 months	13.5 months	6 months	14.5 months
Minimum:	8.5 months	8.5 months	8.5 months	8.5 months		8.5 months

¹ Currently applies only to 7823.

² Varies depending on the volume of waste stored when closure is initiated.

Low-activity Mixed LLW. Closure will be initiated approximately 20 years from the permit date or operation date, whichever is later. Containers will be removed in approximately one month.

The initial cleaning and decontamination will be completed in approximately one-half month. Sampling and analysis to verify that residual contamination is not present at the unit will require approximately two months to complete. Subsequent cleaning and decontamination is not anticipated, but if required, would be completed in two weeks. Verification sampling and analysis will be completed in approximately six weeks.

WPF CH and RH Units. Closure will be initiated approximately 5 years from the permit date or within 90 days after receipt of the final mixed wastes. Waste processing of mixed waste inventory will require approximately 1 month, depending upon the amount and type of mixed waste. Sampling and analysis to verify that residual contamination is not present in the units will require approximately three months to complete. Subsequent cleaning and decontamination for RCRA constituents is not anticipated, but if required would be completed in approximately one month. Verification sampling and analysis will be completed in approximately two months.

6-1d(1)Time Allowed for Closure

TRU Wastes. Because of high radiation levels, mixed TRU wastes in the units covered by this document cannot be removed, treated, and transported off-site or stored on-site within 90 days from receipt of the final volume of waste at the unit. Off-site shipment of these wastes is not currently feasible because of lack of DOT-approved containers for TRU wastes and the lack of suitable off-site, approved storage facilities for such wastes. In addition, the logistics for TRU waste removal and tight site constraints contribute to the difficulties for removing the TRU waste. Therefore, the waste removal will take longer than 90 days. Similarly, all closure activities cannot be completed within 180 days from receipt of final volume of waste at the units.

Low-activity Mixed LLW

Time allowed for closure of units storing low-activity mixed LLW will be as follows:

- (1) All hazardous wastes will be treated, removed off-site, or disposed of on-site within 90 days from receipt of final volume of waste.
- (2) All closure activities will be completed within 180 days of receipt of the final volume of waste at the unit, or notification of closure of a unit that has been placed in standby, at the unit(s) being closed; or 180 days after approval of the closure plan, whichever is later.

Once the units have been decontaminated, they will be reused for non-RCRA activities or abandoned.

6-1d(1)(a) Extensions of Closure Time

TRU Wastes. It is expected that an extension of closure time will be required for these units because closure activities will require longer than 90 days for removing all mixed TRU wastes (or within 90 days after approval of the closure plan) and will require longer than 180 days from the receipt of the final volume of waste at the unit (or within 180 days after approval of the

closure plan). All closure activities must be conducted in a manner that addresses radiation, personnel safety, and health (e.g., ALARA) concerns and also recognizes the limited work space constraints and equipment logistics involved.

The containers in these units have greater than 100 nCi/g of radiation and contain alpha-emitting radionuclides with atomic numbers greater than 92 and half-lives greater than 20 years or have radiation with equivalent radiological properties. Although beta and gamma radiation may be present, alpha radiation is the primary hazard. Surface radiation dose rates are of major concern during closure. If there has been leakage from a container and alpha-emitting radionuclides are detected outside the containers, the alpha may be of significant concern if it is inhaled, ingested, or enters the body through a wound. Depending on the element and the associated metabolic pathway, internal emitters tend to seek various organs and irradiate them. Therefore, respiratory protection is crucial. Beta radiation only penetrates a small distance through tissue; the primary external effect is on the skin.

The hazards posed by these radioactive substances limit the time personnel can spend working in or around these substances and increase the amount of time needed to ensure adequate protection is provided throughout the closure process. Thus, radiation concerns contribute to the amount of time required to complete closure.

Radiation dose rates to personnel working in a storage unit can exceed 20 mrem/d, which is the DOE limit. To ensure that the 20 mrem/d limit is not exceeded, all work and personnel must be carefully monitored and actual worktime must be limited accordingly. Due to the expected level of dressout, work time in the units may be reduced during hot, humid, or extremely cold weather.

Every container that is removed will be monitored and smeared for radiation. Those results will determine whether a leak is detected. If a leak is detected, the container will be repaired, replaced, or overpacked as appropriate to facilitate subsequent handling. The radiological contamination will be removed from the unit by wiping, scraping, or water rinsing, as necessary.

As noted earlier, weather conditions will limit the waste removal activities. Removals will not be conducted during inclement weather to avoid the spread of contamination.

Low-activity Mixed LLW. If unforeseen circumstances indicate that an extension of closure time will be needed, one or more of the following will be demonstrated to the regulatory authority:

- wastes cannot be treated, transported to an off-site facility, or stored or disposed of on-site within 90 days from the receipt of the final volume of waste;
- closure activities require longer than 180 days;
- availability of disposal units is delayed or unavailable; or
- closure would prevent continued operation of the unit(s).

In the event an extension is required, WO will demonstrate that all steps have been and will be taken to prevent threats to human health and the environment from an unclosed but inactive unit.

It is not anticipated that an extension from the requested closure time will be needed for the WPF units. However, should an extension be necessary, it will be requested in accordance with Rule 1200-1-11-.06(7)(d).

6-1e Closure Procedures

Closure procedures for the TRU wastes stored in the units addressed in this document will involve:

- (1) removal of all mixed wastes;
- (2) repackaging (if needed) and certification of any wastes to an off-site facility (such as WIPP);
- (3) transport of certified wastes to the WIPP or another off-site RCRA-permitted facility;
- (4) evaluating radiation levels in the emptied unit to detect potential releases of wastes;
- (5) initial cleaning/decontamination of the unit;
- (6) testing for potential RCRA contamination if radiation levels suggest a release in the emptied unit;
- (7) follow-up decontamination of the unit for identified RCRA constituents; and
- (8) retesting for validation that decontamination criteria for identified RCRA constituents have been met.

Closure procedures for the low-activity mixed LLW stored in the units addressed by this document will involve:

- (1) removal procedures for the low-activity mixed LLW at the unit(s), including, hazardous, mixed, and radioactive;
- (2) removal/repackaging (if necessary) of wastes;
- (3) transport of wastes to an approved off-site facility or on-site unit(s);
- (4) initial cleaning/decontamination of the unit;
- (5) testing for RCRA contamination in the emptied unit(s);
- (6) decontamination of the unit(s) for the identified RCRA constituents; and
- (7) retesting for validation that decontamination criteria for identified RCRA constituents have been met.

6-1e(1) Inventory Removal, Disposal or Decontamination of Equipment

Step 1: Mobilization

Before the initiation of work activities, the units will be surveyed by the HP group. A detailed health and safety plan will be prepared based on the HP assessment. The plan will summarize the identified chemical and radiological hazards present at the work site and identify control

measures to reduce worker risk to ALARA levels. The plan will specify worker qualifications, personal protective equipment, safety awareness, radiation work permits, exposure control programs, decontamination procedures, and emergency coordination. The plan will be developed in compliance with 29 CFR 1910.120, and all workers will be required to show documentation of training and medical monitoring as required by this Occupational Safety and Health Administration (OSHA) standard.

Equipment required for closure will be brought to the unit and will include, but will not be limited to, cranes, forklifts, backhoes, pressure cleaners, decontamination units, and waste transportation vehicles.

Step 2: Waste Removal, Treatment, and Disposal

Waste Removal

TRU waste containers will be removed from the units, certified, and repackaged as necessary at another permitted unit prior to shipment to WIPP or another off-site disposal facility. Certified waste may be temporarily staged back at the units prior to shipment to WIPP or another off-site disposal facility. However, all containers will be removed from the units as part of the final closure activities.

All containers of low-activity mixed LLW will be transferred to approved on-site units or off-site facilities for treatment, storage or disposal. All low-activity mixed LLW will be removed and packaged in accordance with DOT/RCRA regulations.

RCRA contamination of these container units is not expected, but if contamination is found, the contaminated residues will be properly decontaminated, stored, or disposed. Materials that cannot be decontaminated will be collected, packaged, tested for hazardous constituents, and removed as necessary for proper disposal. Contaminated materials may include decontamination solutions, contaminated debris/sediments, small tools, personal protective equipment, building materials, and soil.

During container removal and throughout the closure period, efforts will be made to ensure that the closure process does not impact public health or the environment. The impact from precipitation during the closure of the TRU waste storage units will be minimized by performing work activities only under cover or during periods of no precipitation. Additionally, the inspections described in Section F-2 will continue during the closure period. Once wastes have been removed, inspections will be limited to security and unit structures (foundation, floors, etc.).

Waste Treatment

The closure will not involve significant waste treatment. Before closure, the containers will be transported to another RCRA-permitted unit for repackaging and certification. This process could involve repackaging or other preparation prior to disposal at an off-site facility, such as WIPP. Wastewater that may be generated during decontamination of equipment and units will

be routed to the ORNL Liquid Low- Level Waste (LLLW) treatment system for concentration and ultimate disposal.

Transportation

Mixed waste will be transported from the site in accordance with DOT and RCRA requirements. All vehicles transporting hazardous waste off-site or across public roads will be placarded and will receive proper manifest papers. TRU mixed waste containers destined for disposal at an off-site facility, such as WIPP, will be transported in a transuranic package transporter (TRUPACT-II) or other specially designed shipping containers for mixed wastes. The TRUPACT-II will hold fourteen 55-gal drums and is designed to comply with all applicable federal regulations that govern the design and operation of equipment for transportation of nuclear materials in interstate commerce. Low-activity mixed LLW containers will be transported from the unit to an on-site unit or an off-site permitted facility.

Disposal

TRU waste will be disposed of at an off-site facility, such as WIPP, or moved to a RCRA-permitted treatment, storage, or disposal (TSD) unit as appropriate. Waste containers will be shipped to an off-site facility, such as WIPP, for disposal prior to initiation of closure. TRU wastes identified during decontamination or soil removal activities will also be disposed at WIPP. Other mixed wastes removed during closure activities will be managed at an approved RCRA TSD unit. Wastewater accumulated from decontamination activities will be routed through the LLLW treatment system at ORNL for concentration and ultimate disposal. Facility selection for other hazardous wastes will be governed by the waste's radiological and RCRA characteristics.

Step 3: Initial Decontamination and Sampling

Contaminated areas will be cleaned using methods appropriate for the wastes, such as sweeping, scraping, steam cleaning, washing, or scrubbing. Samples will then be taken to determine if hazardous constituents at RCRA-regulated levels [40 CFR 261.24 as incorporated by reference in TN Rule 1200-1-11-.02(2)(a)1] remain. If contamination is found, a second decontamination step will be conducted, and sampling for those RCRA-regulated constituents (see below) found during the initial sampling phase will be performed.

A representative number of samples from each contaminated area/storage bay within the unit will be collected using wet swipe (over a 100 cm² area). The swipes will then be analyzed for total metals and/or organics (see under Method 1311, EPA SW-846). Testing will be based on an evaluation of the hazardous constituents stored in the units and the spill records for each of the units. The level of total metals and/or organics will be divided by 20 to approximate the quantity that would leach under the TCLP. The resulting value will be compared to the regulatory limit listed in Table 1 of 40 CFR 261.24 as incorporated by reference in TN Rule 1200-1-11-.02(3)(a)1 to determine whether additional decontamination and retesting using the TCLP should be conducted. Further decontamination will be undertaken if the calculated value is within 95% of the regulatory limit. Analytical and field quality assurance/quality control will be implemented as required in the organization SOPs and EPA SW-846. The units covered in this document will be decontaminated, if necessary, to meet DOE-approved radiation levels for

reuse as non-RCRA units. Contamination of surrounding soils and groundwater is not expected; however, if found, the site will be considered for inclusion in the Federal Facility Agreement for the Oak Ridge Reservation and remediated in accordance with the overall site remediation plan. If radioactive decontamination of the unit is necessary, decontamination for hazardous constituents will also be considered by evaluating RCRA parameters in the rinse water. Any rinse water will be analyzed by the TCLP (for RCRA metals and organics) to determine if the liquid is a hazardous waste.

Decontamination criteria will be met if the TC concentrations are less than regulated limits. When radiation decontamination is required in accordance with DOE guidance, decontamination levels will follow applicable Health Physics procedures. The cells will be decontaminated to less than 300 dpm/100 cm² alpha (by direct reading) or less than 20 dpm/100 cm² alpha (transferable). If radioactive decontamination fails, the surface will be painted/coated or otherwise treated.

Equipment contacting the waste or used in the decontamination process will be decontaminated by double rinsing with a mild acid solution followed by a third clean water rinse. A composite water sample collected from the third rinse will be analyzed by EPA-approved methods in SW-846. Analytical and field QA/QC will follow EPA-approved procedures in SW-846. Table I-3 lists the equipment that may require decontamination. Decontamination efforts will continue until the decontamination criteria are met.

Step 4: Further Decontamination and Sampling

If analyses indicate that RCRA-hazardous constituents remain at regulated levels after the initial decontamination, the unit will be decontaminated a second time using methods appropriate to the waste. Samples will be collected from the areas/bays that showed residual contamination using the same methodology as in Step 2. Samples will be analyzed for those constituents that were present at 95% or higher of the RCRA-regulated level.

Analytical and field quality assurance/quality control will be implemented as required in the organization SOPs and SW-846.

Step 5: Soil Sampling

Soil surrounding the units is not expected to be contaminated. However, soil samples will be collected if the initial building contamination assessment shows that the building is contaminated with RCRA constituents or, based on operational records of spills, if RCRA constituents have potentially migrated to the environs. Soil samples will be collected from the first foot of soil below the unit. The number of samples collected will be determined by size of the area per EPA guidance (SW-846).¹ The soil collected will be analyzed by SW-846

¹ Sampling plans will be updated when the units are slated for closure so that plans will be consistent with EPA guidance at that time.

methods, or applicable standard at the time of closure, for hazardous waste constituents such as RCRA metals/organics based on operational records. The sample results will be compared to the results from three clean background soil samples collected from geologically similar areas around ORNL. Analytical and field QA/QC will follow SW-846 procedures. If RCRA contamination is above background levels and is extensive in the soil surrounding the contaminated units, a more detailed sampling and assessment plan will be prepared for TDEC approval.

Table 6-3. Estimated equipment requiring decontamination during closure

Equipment	Method of decontamination or disposal
1 Crane	Double rinse with a mild acid solution and perform third rinse with water. Dispose of liquid at the LLLW treatment unit.
Nonsparking portable pump and hoses	Same as for the crane.
Shovels	Same as for the crane.
1 Forklift	Same as for the crane.
1 Two-ton truck	Same as for the crane.
Backhoe or excavator	Same as for the crane.
2 Cleaning devices (brooms, scrapers, etc.)	Same as for the crane.
Miscellaneous rags, paper products, etc. (Total = 1/3 drum or 2.5 ft ³)	Drum for future incineration or disposal at an approved unit.
Temporary liner for decontamination area (Total = 1/3 drum or 2.5 ft ³)	Same as for Miscellaneous.
Rubber gloves, protective clothing, and boots (Total = 1/3 drum or 2.5 ft ³)	Same as for Miscellaneous.

Step 6: Soil Removal

If RCRA contamination of the soil is found, removal criteria will be governed by the extent of contamination. If significant soil contamination is found, the cleanup criteria will be determined by the health assessment-based clean-up levels from the most current RCRA Facility Investigation Guidance at the time of closure. If minor contamination is detected in the soil, those areas will be excavated to the background level. All removal determinations will be subject to the approval of TDEC.

Step 7: Building Usage

Once the units have been decontaminated, they will be reused as non-RCRA units or decommissioned in accordance with DOE decontamination and decommissioning policy.

It is the intention to completely decommission the WPF unit, including the permitted units at the time of its closure by decontaminating the equipment and building and then removing the entire Facility, sending any residues or materials that cannot be completely decontaminated to an appropriate disposal facility, and providing, for reuse or recycling, any materials which have been decontaminated. An extensive D&D plan will be developed to remove the radiological hazard that may exist at the time of closure and this radiological D&D plan will be maintained in files separate from this permit.

6-1e(2) Closure of Containers

All containerized mixed wastes in the units will be removed off-site to WIPP or to another treatment or storage unit if disposal is not available by the end of closure. The units will be cleaned and/or decontaminated to remove residual hazardous constituents from the units. Contamination by the RCRA components of the waste is not anticipated.

Refer to Section 6-1e(1) for a discussion on the removal and disposal of contaminated soil; decontamination of cleanup materials, equipment, and residues; and demonstration that decontamination has been effective.

6-2 POST-CLOSURE PLAN

The units covered in this permit application will be clean closed; therefore, a post-closure plan will not be needed.

6-3 CERTIFICATION AND NOTICES REQUIRED FOR CLOSURE

6-3a Certification of Closure

Within 60 days upon final closure of the units covered by DOE, BJC, and WESKEM in this document, DOE, BJC and WESKEM will submit in writing, via registered mail, a closure

certification to the commissioner of the TDEC. The certification will specify that the unit was closed in accordance with the approved closure plan. The certification will be signed by DOE and BJC and by an independent registered professional engineer. Certification of completion of the CERCLA RA by an independent professional engineer is equivalent to the RCRA certification of closure.

Within 60 days upon final closure of the units covered by FW in this document, DOE and Foster Wheeler Environmental Corporation, will submit in writing, via registered mail, a closure certification to the commissioner of the TDEC. The certification will specify that the unit was closed in accordance with the approved closure plan. The certification will be signed by DOE and Foster Wheeler Environmental Corp. and by an independent registered professional engineer.

6-4 CLOSURE COST ESTIMATE

Under 40 CFR 264.140(c) and TN Rule 1200-1-11.06(8), federal facilities are exempt from the requirements for closure cost estimates. Because the units covered in this document are located on a federal facility, no closure cost estimates are included with this plan.

6-5 FINANCIAL ASSURANCE MECHANISM FOR CLOSURE

Under 40 CFR 264.140(c) and TN Rule 1200-1-11.06(8), federal facilities are exempt from the requirements for financial assurance. Because the units covered in this document are located on a federal facility, this information is not included in this plan.

6-6 POST-CLOSURE COST ESTIMATE

Under 40 CFR 264.140(c) and TN Rule 1200-1-11.06(8), federal facilities are exempt from the requirements for post-closure cost estimates. Because the units covered in this document are located on a federal facility, no post-closure cost estimates are included with this plan.

6-7 FINANCIAL ASSURANCE MECHANISM FOR POST-CLOSURE

Under 40 CFR 264.140(c) and TN Rule 1200-1-11.06(8), federal facilities are exempt from the requirements for financial assurance. Because the units covered in this document are located on a federal facility, this information is not included in this plan.

6-8 LIABILITY REQUIREMENTS

Under 40 CFR 264.140(c) and TN Rule 1200-1-11.06(8), federal facilities are exempt from liability requirements including sudden and nonsudden insurance. The units covered in this document will always be under the permanent care of DOE or another authorized federal agency; therefore, this information is not included.

6-9 STATE FINANCIAL MECHANISMS

This site will always be under the permanent care of DOE or another authorized federal agency. State assumption of the legal or financial responsibilities will not be requested.

ATTACHMENT 7 CONTAINER MANAGEMENT

This section discusses specific process information for the RH-TRU, CH-TRU, and waste examination units, including those units associated with the WPF, as well as their secondary containment, leak detection, and collection systems. Wastes stored in the TRU units primarily consist of solid transuranic waste containing RCRA metals or other hazardous constituents. The wastes stored in the TRU units would primarily consist of D004 - D011 metals but may also contain sludges, aerosol cans, gas cylinders, solvent wipes, or other liquids. As such, those wastes may contain F001 - F006 solvents, D001, D002, D014 - D043 organics, or even P or U listed wastes. The mixed LLW (high-activity or low-activity) that may be stored in any of the CH-TRU or RH-TRU units in this document may contain any of the RCRA components identified in Table 1-1 for each of these units. The storage capacities for each unit are represented in Table 7-1.

Engineering drawings for most of the units are included in Appendix 7-1. 40 CFR 270.14(a) [TN Rule 1200-1-11-.07(5)] states that certain technical data, such as design drawings and specifications, and engineering studies shall be certified (as designated by a stamp) by a registered professional engineer (PE). For the proposed storage units (Buildings 7577, 7576, 7580, and 7884) in this document that are tentatively planned for construction in 1998 and later, no certified engineering drawings are available at this time. Certified drawings of the proposed units will be submitted as revisions to this document as they become available. For buildings constructed prior to 1988 (i.e., Buildings 7823, 7842, 7855, and 7878), TDEC accepts pre-existing engineering drawings pursuant to 40 CFR 270.14(a) [TN Rule 1200-1-11-.07(5)] without the certification by a registered PE because: (1) the design drawings of the units predate the TDEC resolution of the applicability of Tennessee Code Annotated 62-2-103(4) to such drawings; (2) the original drawings and specifications were not, nor were they required to be, certified by a registered PE; and (3) good engineering practices appear to have been utilized with respect to the units reflected by the signatures of the building engineers.

7-1 CONTAINERS

This section describes the storage capabilities of each of the waste storage units.

7-1a Containers With Free Liquids

RH-TRU Units. TDEC approves ORNL's requested waiver from portions of the requirements for container storage areas for the RH-TRU units under 40 CFR 264.175 and TN Rule 1200-1-11-.06(9)(a)1 for:

7-1

Class 1 Modification, Dated: 10/29/02
Temporary Authorization – Dated: 3/6/06
Class 2 Modification - Dated: 1/25/07

Table 7-1. Storage capacities for TRU and Class III/IV storage units

Building number	Maximum area (ft²)	Maximum volume (gal)
7572	7,000	220,000
7574	4,000	94,800
7576 (proposed)	5,000	245,000
7577 (proposed)	7,000	219,632
7580 (proposed)	4,000	68,000
7823	4,480	89,586
7842 ¹	3,384	94,800
7855	2,700	96,433
7878 ²	2,774	75,840
7879	3,744	114,708
7883	3,960	96,433
7884 (proposed)	6,372	144,517

¹ 7842 has had waste removed and has been demolished and placed under SWSA 6 CERCLA cap as part of TDEC approved closure.

² 7878 has had waste removed and has been demolished and placed under SWSA 6 CERCLA cap as part of TDEC approved closure.

- 40 CFR 264.175(b)(1) or TN Rule 1200-1-11-.06(9)(a)1 - A base must underlie the containers that is free of cracks or gaps and is sufficiently impervious to contain leaks, spills, and accumulated precipitation until the collected material is detected and removed.
- 40 CFR 264.175(b)(3) or TN Rule 1200-1-11-.06(9)(a)1 - The containment system must have sufficient capacity to contain 10% of the volume of containers or the volume of the largest container, whichever is greater. Containers that do not contain free liquids need not be considered in this determination.

The request for a waiver is based on the small volume of free liquids stored, or to be stored, in the RH-TRU units, the fact that the free liquids are not RCRA wastes, the RH-TRU packaging procedures, and the fact that the RCRA wastes in the units are limited primarily to elemental lead and mercury but may also include other RCRA hazardous solid waste.

Containers that were placed in storage between 1980 and 1985 contain an estimated 0.05 to 1% free liquids (dilute acids or water from cell cleaning operations). Beginning in 1986, free liquids have been eliminated from the containers using administrative and procedural controls implemented at ORNL. Moreover, the RCRA components within the RH-TRU waste are primarily elemental lead and mercury, making the probability of a release of RCRA-contaminated free liquids very small. Since all the RH-TRU wastes are packaged, sealed, and overpacked with two or three levels of containment, the likelihood of a leak from a container is very low. Given the normal waste packaging procedures that result in all containers having void space equal to at least half of the container volume, the remaining capacity in each cask is more than sufficient to contain any free liquids (non-hazardous) that might leak from the first one or two levels of containment. Any high-activity mixed LLW that may be stored in the RH-TRU units will also consist only of solids; therefore, secondary containment is not required and impervious, crack-free floors are unwarranted. Thus, the requirements for the RH-TRU units to (1) contain 10% of the volume of the containers and (2) have a base that is free of cracks and gaps and sufficiently impervious to contain leaks and spills are deemed unwarranted.

In addition, a waiver from the above regulatory requirements with equivalent protection was requested for storage of cask overpacks in Building 7823. This request was granted based on the following:

- The wastes inside the casks are primarily solid in form.
- Each cask retrieved from the trenches in SWSA 5 North will be placed into a steel overpack lined with a 6-mil polyethylene bag, which will provide two layers of secondary containment for the contents of the casks.

- The overpacks are almost 9 ft tall and 5 ft in diameter and will provide 340 cu ft of containment constructed of 3/16-inch-thick steel, weighing about 1800 pounds empty and up to 16,000 pounds when holding a cask. The size and weight of the filled overpacks require that containment pallets be specially designed and fabricated; available standard designs cannot accommodate them. Providing additional secondary containment would incur substantial cost for negligible additional protection of human health and the environment.

The level of containment provided by the overpacks is therefore equivalent to what would be provided by other types of secondary containment, such as containment pallets.

7-1a(1) Basic Design Parameters, Dimensions, and Materials of Construction

The dimensions and basic design parameters of the secondary containment structures are provided in Appendix 7-2. Floor plan drawings of each unit are included in Attachment 5.

RH-TRU Units. The RH-TRU storage units are, or will be, concrete structures. Floors in Building 7855 are unsealed concrete which will support the weight of the stored containers. They are, however, compatible with the waste stored in the unit. The pads for Buildings 7883 and 7884 will be sealed and coated with an epoxy that is compatible with the waste to be stored in the units.

CH-TRU Units. The CH-TRU units are, or will be, constructed with concrete floors which will support the weight of the stored containers. The base underlying the containers is, or will be, free of cracks or gaps. The concrete floors and diking in Buildings 7572, 7574, 7576 (proposed), 7577 (proposed), 7580 (proposed), 7878, and 7879 are, or will be, free of cracks and gaps and sealed with an epoxy coating. The floors and diking in Buildings 7823 and 7842 are not free of cracks and gaps, so additional secondary containment systems will be utilized. Building 7823 will store hazardous wastes in portable containment systems that are free of cracks and gaps, or in an overpack container meeting the requirements of subparagraph III.F.2(f), thereby meeting RCRA permitting standards. Drawings of the metal pallets with built-in secondary containment are in Appendix 7-2 (Figs. 7-2-1 and 7-2-2). The concrete bases of all nine ORNL CH-TRU units are, or will be, of sufficient strength to support the weight of the waste, pallet, and/or portable secondary containment system.

Construction materials of the floors, portable containment systems, cask overpacks, and/or overpack liners are, or will be, compatible with the materials stored at the units.

WPF Units. The units associated with the WPF are not used for long term storage of mixed waste. They are used to support processing, including characterization and repackaging of

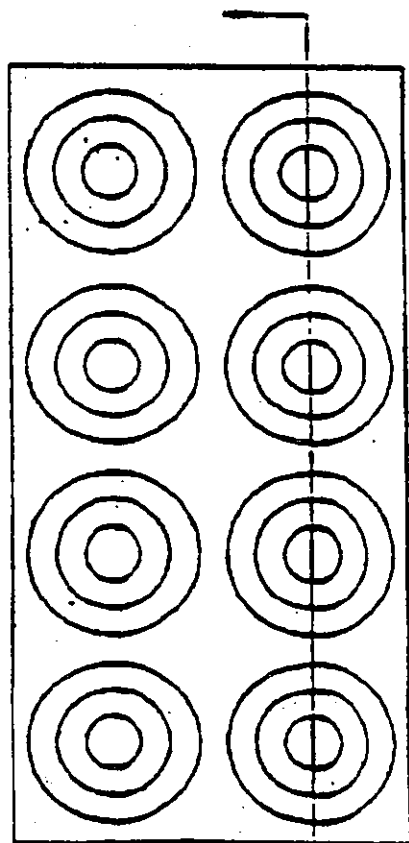
waste, currently stored in the other units authorized under this permit, for disposal off-site. The base of the storage areas for waste containers (except for DAC and CSA units) is a reinforced concrete slab, free of cracks or gaps, and covered with a sealant impervious to leaks, spills, and accumulated liquids. The slab is designed to withstand dead loads and live loads from the containers, pallets, overpacked casks, and container handling equipment. Wastes that are identified as containing liquids either by process knowledge or RTR are placed on pallets with built-in secondary containment, or other secondary containment systems such as spill pans, that are free of cracks and gaps. Construction materials of the floors, portable containment systems, and cask overpacks are or will be compatible with materials stored at the units. The DAC and CSA units will be equipped with one of the above secondary containment systems, as required. The secondary containment systems will be compatible with materials stored at the units.

7-1a(2) Description of How Design Promotes Drainage or How Containers are Kept from Contact with Standing Liquids in Containment System

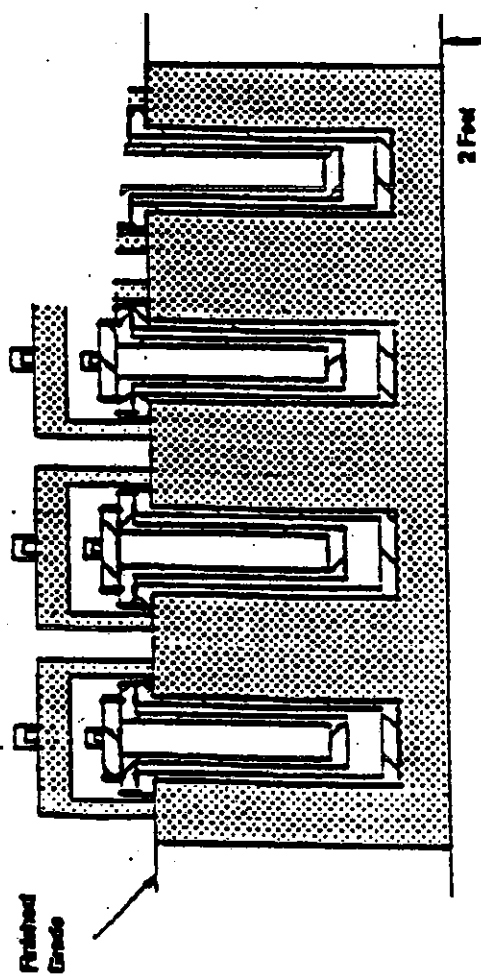
RH-TRU Units

Building 7855. In the RH-TRU Retrievable Concrete Cask Storage Facility, the containment design involves both liquid containment systems and unit design to prevent run-on. The unit has both an internal and an external liquid containment system. The internal containment system is designed and operated to drain and remove any accumulated liquids (i.e., seepage and/or condensate). The internal drainage system consists of four 10-in.-wide trenches with galvanized grating (one trench in each bay) that lead to two 2-in.-diameter polyvinyl chloride (PVC) pipe drains that end at an external sump. The external sump contains two small sampling stations that allow testing of accumulated liquids from each piping unit (the inspection, sampling, and disposal are discussed in Attachment 3). The capacity of the internal drainage system is 49.4 ft³. Additionally, the stored casks are placed on steel pallets that elevate casks approximately 7 in. above the floor, which also serves to protect the casks from contact with any accumulated liquids.

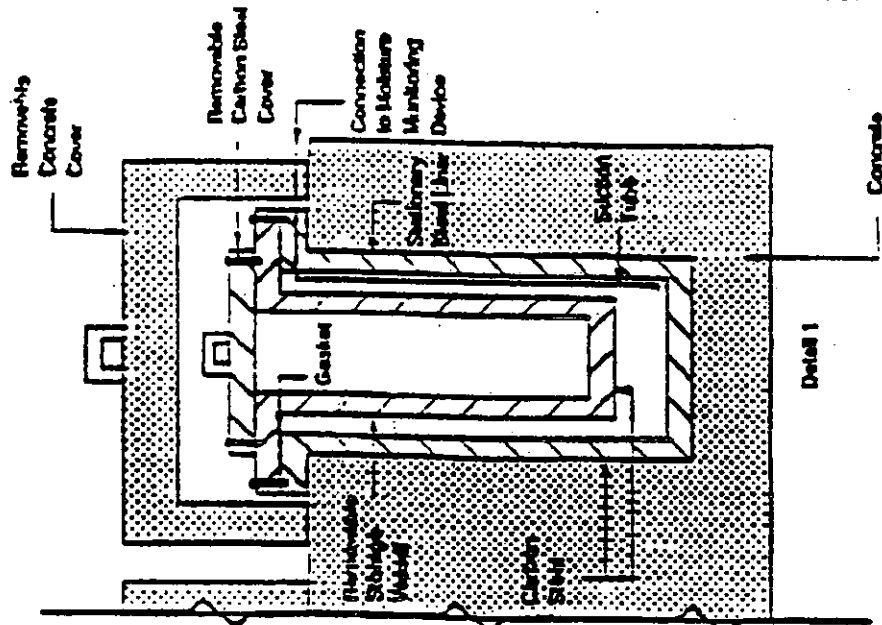
The external system collects run-off from the earth-covered roof and sides of the building. It consists of a 4-in.-diameter concrete pipe leading into a concrete catch basin. In addition, the open face of the building is designed to prevent run-on from entering the unit. The building's apron and roadway are sloped away from the entrance to eliminate problems caused by run-on (see Appendix 7-1).



Plan View



Section A
Second High Water Table



WASTE STORAGE VAULT

Fig. 7-1
Waste Storage Vault Plan, Section, And Detail (Conceptual)

Buildings 7883 and 7884 (proposed). The containment design for the RH-TRU waste storage units, Buildings 7883 and 7884, involves both the use of liquid containment systems and unit design to prevent run-on. Each unit will have two liquid containment systems: an internal system and an external system. Internally, the base of each unit will be constructed with 10-in. minimum thickness reinforced concrete coated with an epoxy coating. Continuous water stops will be used in all construction joints below grade (see Appendix 7-2). Design drawings are not yet available for Building 7884; however, design is expected to be similar to that of Building 7883. The internal containment system will be designed and operated to drain and remove accumulated liquids (i.e., seepage and/or condensate). The internal drainage system will consist of four 10-in.-wide trenches with galvanized or equivalent grating (one trench in each bay) sloped to a PVC pipe which drains to an external collection box (see Appendix 7-1).

The detection sump will contain concrete partitions separating the sump into separate sampling zones corresponding to each of the storage bays. The sampling stations will allow testing of any accumulated liquids from each piping unit. (The inspection, sampling, and disposal of liquids from the sump are discussed in Section 7-2.) The capacity of the internal drainage system will be approximately 2100 gal for Building 7883 and 3000 gal for Building 7884. The stored casks will be placed on steel pallets that elevate the casks approximately 7 in. above the floor, which also serves to protect the casks from contact with any accumulated liquids. Any drums of mixed LLW (high-activity or low-activity) will be stored on pallets to protect those containers from contact with accumulated liquids. Mixed LLW in boxes are elevated approximately 4 in. above the floor by the legs of the boxes.

An external system will collect and divert run-off from the earth-covered roof and sides of each of the buildings. Rainfall onto the roof will drain down the sloped earthen sides of the buildings and flow to an earthen drainage feature sloping to either side of the buildings, past the front, and downslope away from the structure. A trench drain will be installed around the perimeter of each of the buildings to prevent the accumulation of groundwater against the building.

Construction details of the drain are shown in Appendix 7-1. The metal track-mounted doors will prevent run-on from entering the units. The buildings' aprons and roadway will be sloped away from the entrance to eliminate problems caused by run-on.

CH-TRU Units

Building 7823. Stored drums of mixed waste in Building 7823 may be placed on metal pallets with a self-contained secondary containment system that elevate the drums approximately 11 in. above the floor and serve to protect them from contact with any liquids (see Appendix 7-1). Alternatively, drums of mixed waste on regular metal pallets and other

mixed waste containers, such as intermodals or B-25 boxes, will be placed inside a lined berm in Building 7823. Concrete casks will be stored in metal overpacks providing secondary containment and meeting the requirements of subparagraph III.F.2(f).

Buildings 7572, 7574, 7576, 7577, 7580, 7878, and 7879. For each of these units, the container storage area floors and surface drains have, or will have, downward gradients of 1/8-in./ft. The slopes of these structures and the secondary containment area base are adequate to allow liquids resulting from leaks or spills to flow rapidly into the secondary containment area sumps, where present, or floor depressions away from containers. The stored drums are, or will be, placed on pallets that elevate the containers approximately 4 in. above the floor and also serve to protect the containers from contact with any liquids. Mixed LLW in boxes are elevated approximately 4 in. above the floor by the legs of the boxes. The operation and design of the storage units ensure that the containers are protected from contact with accumulated liquid (see Appendix 7-1 for drawings of Buildings 7879, 7572, 7574, and 7878). Metal pallets with self-contained secondary containment systems may be used to store the mixed LLW (high-activity or low-activity) in these CH-TRU units. The metal pallets will elevate the containers approximately 11 in. above the floor and serve to protect containers from contact with any liquids (see Appendix 7-2).

Design drawings are not yet available for Buildings 7576, 7577, and 7580. However, the designs and operating procedures are expected to be essentially similar to the design of Building 7879. Drawings will be submitted as revisions to this document as they become available.

WPF Units

Any CH waste containers that are found to contain liquid during NDE will be placed on pallets, or equivalent, with self-contained secondary containment systems that elevate containers above the base surface to eliminate potential contact with accumulated liquids within the containment system. Since the containers are elevated and protected from contact with liquids, sloping of the base is not required. Sets of 4 drums per pallet, each with built-in secondary containment, will be double-stacked in the storage area, if required. Boxes may be double stacked in the storage areas.

The CHMB, floor is sloped to a centrally located containment trench, or sump as required. The slope, and the 6 inch building curb to the floor base are adequate to allow liquids resulting from leaks or spills to flow into the secondary containment trench/sump area. Additionally as noted in Attachment 1, the expected amount of liquids in the CH waste containers is minimal (i.e., less than 1% of the container's volume).

Waste items in the RH concrete casks are typically contained in smaller waste containers within the casks. The concrete casks are placed in steel overpacks to provide secondary containment of the casks and to facilitate handling within the Facility.

7-1a(3) Capacity of the Containment System Relative to the Number and Volume of Containers to be Stored

RH-TRU Units

TDEC approves ORNL's requested waiver for secondary containment (see Section 7-1a) in the RH-TRU waste storage units. No waiver is requested for low-activity mixed LLW operations in these units. Any portable containment systems used (i.e., metal pallets with built-in containment system) will have the capacity to contain a minimum of 10% of the total volume of the liquid wastes stored in that system. Containment structures for low-activity mixed LLW are, or will be, inspected regularly to ensure they remain impervious and in good condition. Routine inspections of the storage areas will promote early spill detection and cleanup and should, therefore, prevent any buildup of spill residues. Inspection schedules and sample inspection logs are shown in Attachment 3.

CH-TRU Units

The CH-TRU units have, or will have, a containment system that will contain at least 10% of the total volume of the liquid wastes stored in the unit or the total volume of the largest container (whichever is greater). Any portable containment system used (i.e., metal pallets with built-in containment capacity) will also have the capacity to contain a minimum of 10% of the total volume of the liquid wastes stored in that system (see Table 7-2 for operating and secondary containment capacities). Containment structures are, or will be, inspected regularly to ensure they remain impervious and in good condition. Routine inspections of the storage areas will promote early spill detection and cleanup and should, therefore, prevent any buildup of spill residues. Inspection schedules and sample inspection logs are shown in Attachment 3.

Secondary containment calculations for the CH-TRU units are shown in Appendix 7-2. Maximum operating capacities for the units are shown in Table 7-2. Maximum operating capacity reflects the maximum volume of wastes that can be stored in a given unit. Because each unit may store containers of varying sizes, it is not feasible to estimate the number of containers that may be stored in any of the units.

WPF

Portable containment systems (e.g., pallets with built-in secondary containment systems or equivalent) will have the capacity to contain a minimum of 10% of the total volume of CH containers stored in that system or the volume of the largest container stored in the system (whichever is greater). These systems are readily available from commercial vendors and are warranted to meet the secondary containment requirements of TN Rule 1200-1-11-.06(9)(f). The concrete RH casks will be placed in steel overpacks upon receipt at the Facility. These steel overpacks, which will be manufactured specifically for the RH casks, will contain the minor amount of liquid potentially present in the casks, as well as facilitate the handling of the casks in the Cask Staging Area of the Facility.

Containment systems will be inspected regularly to ensure they remain impervious and in good condition. Routine inspections of the container storage areas will promote early spill detection and cleanup, thereby preventing the buildup of spill residues.

7-1a(4)Provisions for Preventing or Managing Run-On

RH-TRU Units

Run-on into the containment area is, or will be, prevented by the internal and external liquid containment systems designed to drain and remove accumulated liquids. The casks or LLW containers are, or will be, placed on pallets to prevent contact with any accumulated liquids. The external system collects run-off from the earth-covered roof and sides of the building. Additional information is provided in Section 7-1b.

**Table 7-2. Maximum operating and secondary containment capacities
for the CH-TRU units**

Container storage unit	Maximum operating capacity (gal)	Secondary containment capacity (gal)	Secondary containment as a percentage of maximum operating capacity
7572	220,000	24,152	11%
7574	94,800	13,820	15%
7576 (proposed)	245,000 ¹	17,320/23,250 ¹	7.1% ² 9.6% ¹
7577 (proposed)	219,632	24,152	11%
7580 (proposed)	68,000	13,820	20%
7823	89,586 ⁵	23,436 ⁵	26% ⁵
7842	94,800	18,600	20%
7878	75,840	9,415	12%
7879	114,708 ¹	5,753/19,344 ¹	5.0% ³ /17% ¹
WPF (all units)	168,300 ^{3,6}	28,798 ⁴	44% ⁷

¹ Second calculation for Buildings 7576 and 7879 assumes all containers are stored on metal pallets with built-in secondary containment providing 10% of the total volume of the waste. For Building 7576, secondary containment capacity of 23,250 gal is based on using pallets with containment capacities of 62 gal each. Use of larger pallets, with containment capacities of 80 gal each, will increase the secondary containment capacity to 30,000 gal (or 12%).

² Building 7576, Bulk Contaminated Soil Storage Facility, will store primarily solids. Any low-activity mixed LLW containing greater than 1% free liquids will be stored on metal pallets with built-in secondary containment providing 10% of the total volume of waste.

³ Unit is not used for long-term storage of mixed waste; it is only used for staging of mixed wastes associated with characterization and verification activities.

⁴ WAC will require that free liquids in the waste be limited to less than 1% of the volume of the waste.

⁵ Excludes wastes stored in overpack containers with 100 percent secondary containment capacity.

⁶ Pallets with built-in secondary containment, or equivalent, will be used to provide secondary containment for all containers with liquids.

⁷ Applies to Contact Handled Marshalling Building only.

CH-TRU Units

Run-on into the containment system is prevented by the curbs above the surrounding area. The external gutters direct run-off of rainwater collected from the metal-covered roof and sides of the buildings. In addition, the area surrounding the container storage area is sloped so water will flow away from it.

WPF Units

Three of the container storage areas are located at the elevation of the 2nd floor. The Facility is designed such that the rainfall run-on and run-off is away from the Facility. The container storage areas on the 1st floor are protected from rainfall run-on or run-off since grading around the Facility is designed such that the rainfall is directed away from the Facility. Also, the minimum 1st floor elevation (approximately 771 ft MSL) of the Facility is well above the 100-year flood elevation (approximately 756 ft MSL).

The CHMB floor elevation (approximately 774 ft MSL), is above the 100-year flood elevation of approximately 754 ft MSL. The building has 6 inch integrated curbs and ramped access at vehicle entrances to prevent both run-on and run-off.

Storm water emanating from the site will be directed away from the Facility to a collection area for discharge off-site. Capabilities will exist to retain storm water prior to discharge if a spill or leak which may impact storm water quality is discovered.

7-1a(5)How Accumulated Liquids Can be Analyzed and Removed to Prevent Overflow

RH-TRU Units

Accumulated liquids would be present only as a result of a spill or a leak from one or more containers within the bays, moisture condensate and/or groundwater seepage. If liquid is present in the external sumps in sufficient volume for sampling and analysis requirements, it will be sampled and initially characterized before transfer to storage containers. To determine waste/container compatibility, further analyses may be required to confirm the exact nature of the waste for subsequent storage or disposal purposes.

Removal of spilled liquids will be accomplished by use of portable pumps or by using adsorbents (pads, sand, vermiculite, or other inert material), depending on the quantity and type of material present. Accumulated liquids will be removed once sufficient volume is present to pump (excess of 6 inches). Additional details on removal of accumulated liquids are addressed in Attachment 5-4. When storing low-activity mixed LLW, these storage areas will be inspected weekly (see Attachment 3). Analyses of the accumulated liquids will follow the unit's WAP (see Attachment 1).

CH-TRU Units

Accumulated liquids would be present only as a result of a spill or a leak from one or more containers within the diked areas. If liquid is present in the diked area or in the sumps, it will be sampled and initially characterized before transfer to storage containers. To determine waste/container compatibility, further analyses may be required to confirm the exact nature of the waste for subsequent storage or disposal purposes.

Removal of spilled liquids will be accomplished by use of portable pumps or by using adsorbents (pads, sand, vermiculite, or other inert material), depending on the quantity and type of material present. Accumulated liquids will be removed as soon as possible after their discovery. Additional details on removal of accumulated liquids are addressed in Attachment 5. These CH-TRU storage areas will be inspected weekly or monthly, depending on the type of waste stored (see Attachment 3). Analyses of the accumulated liquids will follow the unit's WAP (see Attachment 1).

WPF Units

Containers stored in the container storage areas mainly contain solid waste and may contain small amounts (1% of container volume) of free liquid. Therefore, the containers are unlikely to leak large amounts of liquids. In the unlikely event of failure of a container containing free liquids, the liquid would be collected in the secondary containment system and will be absorbed and managed as the same waste code as the container from which it came.

Removal of collected liquid will commence promptly upon discovery of the leakage. Leakage will be detected visually, as well as by radiological monitoring. Removal will be accomplished by use of portable pumps or by using absorbents, depending on the type and quantity of material present.

7-1b Containers Without Free Liquids

RH-TRU Units. The RH-TRU units primarily store concrete casks containing radioactive (RH-TRU) waste. The main components of the wastes can be described as metal, plastic, cloth, paper, and glass materials. These materials are generated from operations and experiments using radioisotopes conducted in hot cells and are common to wet chemistry laboratories. Some of the waste stored in the RH-TRU units is classified as hazardous due to the presence of RCRA metals such as lead (D008) or mercury (D009). Other RCRA constituents such as cadmium, solvent wipes, etc., may be present as a result of hot-cell operations. Table 1-1 in Attachment 1, "Waste codes for RCRA wastes stored in the RH-TRU and CH-TRU units," identifies the hazardous waste that may be stored at the RH-TRU units. The RH-TRU units

may also be used occasionally to store solid low-activity mixed LLW containing TC wastes, F001 - F006 wastes, or P or U listed wastes.

CH-TRU Units. Some of the wastes stored in containers at the CH-TRU units do not contain free liquids. These wastes consist of solid TRU waste (primarily metal, cloth, plastic, paper, or glass materials) generated from activities in the ORNL glove box units, from other remediation activities, or from an off-site facility such as NFS. They are stored in the same container storage areas described in Section 7-1a. The CH-TRU units may also be used occasionally to store low-activity solid mixed LLW containing TC wastes, F001 - F006 wastes, or P or U listed wastes.

WPF Units. CH (TRU and LL) and RH waste containers without free liquids will be placed in the same storage areas described above.

7-1b (1) Test for Free Liquids

RH-TRU Waste. Due to the radiological hazards involved with RH-TRU waste handling and because free liquids in amounts greater than 1% of the waste volume have been eliminated from the containers using administrative and procedural controls implemented at ORNL beginning in 1986, testing for free liquids in newly generated waste is not performed.

CH-TRU and High-activity Mixed LLW. The same administrative and procedural controls are in place for newly generated CH-TRU wastes and high-activity mixed LLW. As a result, testing for free liquids is not performed for those wastes.

Low-activity Mixed LLW. The contents of each unique waste stream will be characterized by process knowledge and/or periodic testing.

WPF Units. The contents of each unique waste stream will be characterized by process knowledge and/or testing.

7-1b (2) Description of Storage Area Design and Operation to Drain and Remove Liquids or How Containers are Kept from Contact with Standing Liquids

RH-TRU Units

Building 7855. In Building 7855, the containment design involves both liquid containment systems and unit design to prevent run-on (see Appendix 7-1). The unit has both an internal and an external containment system. Internally, the base of the unit is free of gaps. The internal containment system is designed and operated to drain and remove any accumulated liquids. The internal drainage system consists of four 10-in.-wide trenches with galvanized

grating (one trench in each bay) leading to two 2-in.-diameter PVC pipe drains which end at an external sump. The external system contains two small sampling stations that allow testing of accumulated liquids from each piping unit (the inspection, sampling, and disposal are discussed in Attachment 3). The capacity of the internal drainage system is 49.4-ft³. Additionally, the stored casks are placed on steel pallets that elevate casks approximately 7 in. above the floor, which also serves to protect the casks from contact with any accumulated liquids.

The external system collects run-off from the earth-covered roof and sides of the building. It consists of a 4-in.-diameter concrete pipe that leads into a concrete catch basin. In addition, the open face of the building is designed to prevent run-on from entering the unit. The building's apron and roadway are sloped away from the entrance to eliminate problems caused by run-on.

Buildings 7883 and 7884 (proposed). The containment design of Buildings 7883 and 7884 (proposed) involves both the use of liquid containment systems and unit design to prevent run-on. Each unit will have both an internal and an external containment system. Internally, the base of the unit will be constructed with 10-in. minimum thickness reinforced concrete coated with an epoxy coating. Continuous water stops will be used in all construction joints below grade. Design drawings are not yet available for Building 7884; however, design is expected to be similar to that of Building 7883. The internal containment system will be designed and operated to drain and remove accumulated liquids. The internal drainage system will consist of four 10-in.-wide trenches with galvanized or equivalent grating (one trench in each bay) sloped to a 2-in.-diameter PVC pipe which drains to an external collection box. The 2-in. PVC pipe will be secondarily contained inside a 6-in.-diameter PVC pipe. The 6-in. containment pipe will be open at the sump end, and the 2-in.-diameter carrier pipe will be centered within the 6-in.-diameter pipe on pipe supports (see Appendix 7-1 for drawings of Building 7883).

The detection sump will contain concrete partitions separating the sump into separate sampling zones corresponding to each of the storage bays. The sampling stations will allow testing of any accumulated liquids from each piping unit. (The inspection, sampling, and disposal of liquids from the sump are discussed in Attachment 3.) The volume of the internal drainage system will be approximately 2100 gal for Building 7883 and 3000 gal for Building 7884. The stored casks will be placed on steel pallets that elevate a cask approximately 7 in. above the floor, which also serves to protect the casks from contact with any accumulated liquids. If used for storage of low-activity mixed LLW, containers of mixed LLW will be placed on pallets to protect them from contact with any accumulated liquids.

An external system will collect and divert run-off from the earth-covered roof and sides of each of the buildings. Rainfall onto the roof will drain down the earthen-sloped sides of the buildings and flow to an earthen drainage feature sloping to either side of the buildings, past the front,

and downslope away from the structure. A trench drain will be installed around the perimeter of the buildings to prevent the accumulation of groundwater against the buildings. The metal track-mounted doors will prevent run-on from entering the units. The buildings' aprons and roadway will be sloped away from the entrance to eliminate problems caused by run-on.

CH-TRU Units

The CH-TRU units are designed and/or operated to prevent the containers from being in contact with standing liquids. The units are designed with sloped floors to direct any standing liquids away from containers. Some units contain sumps that further isolate any standing liquid. Stored containers (drums) are, or will be, placed on pallets. The pallets elevate the containers above the floor and serve to protect the containers from contact with any liquids. B-25 boxes are elevated approximately 4 in. above the floor by the legs of the boxes. Precipitation is directed from the container area via roof design and area drainage features.

7-1c Container Management

In consideration of the following regulations, TDEC approves ORNL's requested waiver for the existing and proposed RH-TRU waste storage units for:

40 CFR 268.50(a)(2)(i) or TN Rule 1200-1-11-.10(4) - Each container is clearly marked to identify its contents and the date each period of accumulation begins.

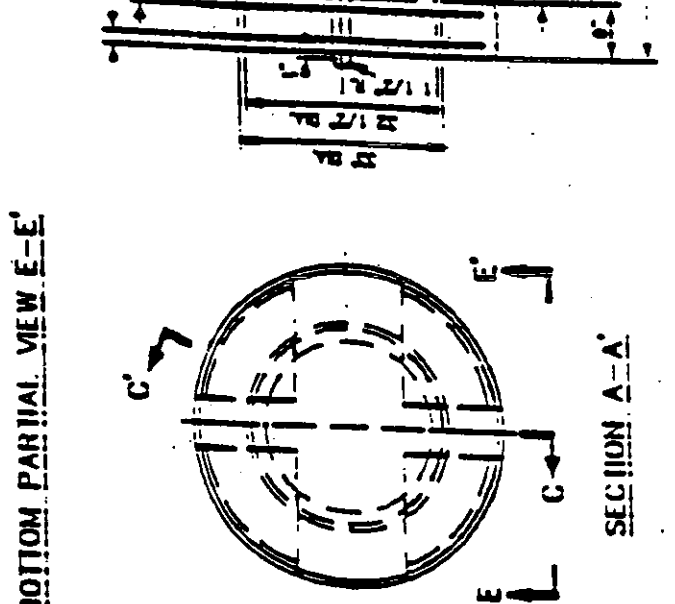
The request for a waiver is based on the inaccessibility of the RH-TRU waste already placed in the concrete storage cells and special handling requirements for newly generated RH-TRU wastes.

Since early 1990, RCRA wastes were required to be listed on the appropriate waste storage or disposal forms for TRU waste and that information is available in the operating records for the units; however, those containers already placed in the cells of the existing RH-TRU unit may or may not have hazardous waste labels. Special handling will be prescribed for newly generated TRU wastes co-contaminated with hazardous constituents. Generators will be required to label their mixed waste inner containers (buckets, drums, etc.) properly so that the RCRA components are identified and quantified. Those inner containers are placed in concrete casks for storage purposes. Unique numbers are placed on each storage cask and on inner containers and can be tracked in the database system. Specially marked plastic covers will be

7-17



Fig. 7-2
INTERMEDIATE WALL CONCRETE CASK



used for closing plastic buckets containing metal containers of RCRA materials in order to be readily identified during repackaging.

Because the information required under 40 CFR 268.50(a)(2)(i) [TN Rule 1200-1-11-.10(4)] is maintained in a unit's operating record and is readily available via a computer database, ORNL feels that a waiver from full compliance with the labeling requirement is warranted.

RH-TRU Waste

Container Information. In most cases, RH-TRU waste from hot-cell operations is placed in concrete casks to provide shielding prior to storage in the RH-TRU units. The concrete casks have been designed with two wall thicknesses, 6 in. and 12 in. respectively as shown in Figs. 7-2 and 7-3. The 6-in. walled casks have a capacity of approximately 57.7-ft³, and the 12-in. walled casks have a capacity of approximately 23.2 ft³ of waste material. Casks are approximately 4.5 ft in diameter and 7 ft in height. The 6-in. and 12-in. walled casks are the only ones currently in use. In a past operation, two 4.5-in. walled casks (roughly the same outside dimensions) having approximately 66-ft³ capacity were placed in Building 7855. The choice of cask for storage purposes depends upon the amount of radiation shielding necessary for the particular waste.

Movement of Containers. The RH-TRU waste is transported on flatbed or lowboy tractor trailers one cask at a time. Trained operators (see Attachment 4) are used for handling all equipment: trucks, forklifts, etc. The casks are currently stored in earth-covered concrete storage bays. RH-TRU units are, or will be, constructed of reinforced concrete. The casks are placed on steel pallets to keep them off the floor and away from any accumulating liquids. Stacking of casks is not practiced nor is it feasible due to unit design. Using a forklift with the cask-handling fixture attached, the cask and its pallet are moved into the storage building. Special care is exercised to ensure that containers are not damaged during placement into the unit. Once inside the unit, casks are rarely (if ever) moved.

Container Inspection. Regularly scheduled inspections are performed by the waste management personnel on the waste storage units for equipment malfunctions, structural deterioration, operational errors, and discharges that could cause or lead to releases of hazardous waste to the environment and/or threaten human health. WM personnel perform daily inspections when waste is being moved. Waste containers are inspected for signs of deterioration, cracks, etc., before moving them into the unit. The inspection parameters and schedules are identified in Table 3-1.

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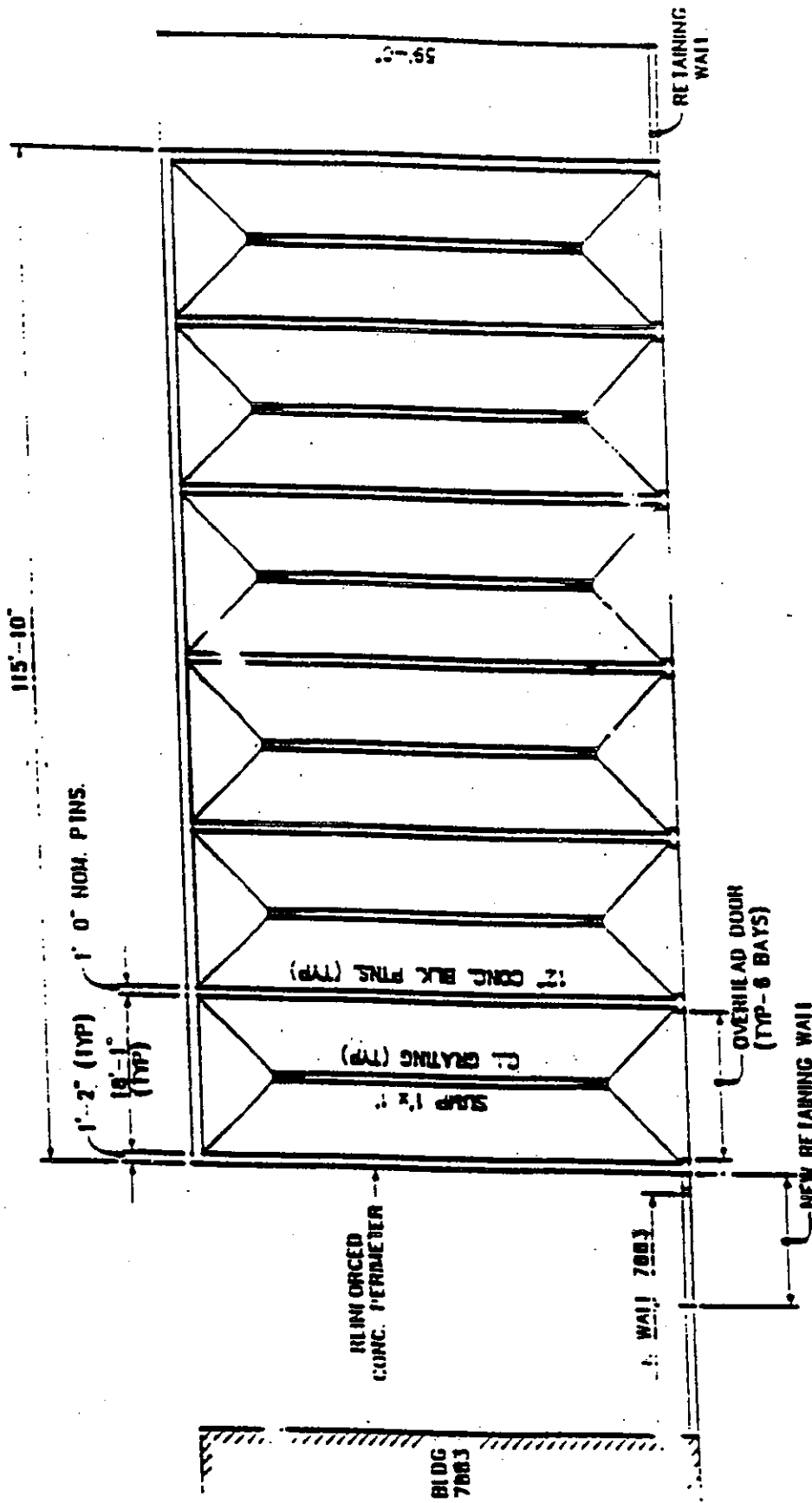
STARTING DATE: 10-9-01
DRAWN BY: BIL SMITH

DATE LAST REV:
DRAWN BY:

DRAFT. CHECK. BY: J. HUBBARD
ENGR. CHECK BY: S. SPARKMAN

DESIGNATOR: S. SPARKMAN
PROJ. MGR.: S. THOMAS

DRAWING NO.: 400400-A
PROJ. NO.: 400400



SCALE: 0 20 40 FEET

Fig. 7-4
RH-TRU WASTE STORAGE FACILITY II - BUILDING 7004

Inspection log sheets are completed during the inspection. After the inspection is completed, the log sheet is filed in the inspection logbook for the unit, and the log sheets are maintained for at least three years at ORNL. Also, routine radiation background surveys are performed at the waste storage units by RP personnel.

If inspections reveal that nonemergency maintenance is required, the maintenance will be completed as soon as possible to preclude further damage and reduce the need for emergency action. If a hazard is imminent (or already has occurred during inspection or between inspections), remedial action will be initiated immediately. If an emergency occurs involving the release of hazardous or radioactive materials to the environment, efforts will be made to contain and remove the hazard and subsequently decontaminate the affected area. Due to the high level of radiation present in these wastes, special precautions must be taken to ensure personnel safety. Further details are provided in Attachment 5.

Management Practices. Waste is placed by the generator in the casks lined with 10-mil PVC material tailored to the size of the cask. When full, the cask's plastic liner may be sealed at the top, and a concrete lid is put in place and secured to the cask body using a metal band. A radiation tag identifying the results of the radiation survey is attached to the cask by RP personnel. The information, along with other appropriate waste data, is entered by the generator and/or RP technician on the waste generator formset (Form UCN-2109 or equivalent). The container and copies of the formset are received by Waste Operations (WO) personnel. Each cask will be assigned a unique number, which identifies and tracks the cask throughout the waste management process. This unique number will be painted on the cask. WO personnel complete the final portion of the request for storage or disposal form pertaining to final disposition of the waste. This information is placed into the unit's operating record and is readily available via a computer database. The concrete casks will be stored in earth-covered concrete storage bays. All the RH-TRU units are, or will be, constructed of reinforced concrete outer walls, roof, and floor. Each bay will be capable of holding 27 casks. Buildings 7855 and 7883 will have four storage bays, which will allow each building to store 108 casks. Building 7884 will have six storage bays allowing for the storage of 162 casks. See Fig. 7-4 for a typical layout of an RH-TRU storage bay area.

In the storage bay areas, the casks will be placed on steel pallets to keep them off the floor and away from possible liquid accumulation. Stacking of casks will not be practiced nor will it be feasible due to the unit design. The concrete casks are placed adjacent to each other to maximize the storage space. Waste containers will always be kept closed in the building.

Once the containers are placed in the RH-TRU units, routine personnel access is not allowed because of high radiation levels and the need to keep exposures to ALARA levels (see discussion in Attachment 3). As each bay is filled to capacity, the bay is closed to prevent

access by any personnel; therefore, no aisle space is needed. Since the stored wastes are primarily solids, have multiple layers of containment, and are not flammable, it is unlikely that emergencies will arise requiring fire protection equipment or spill control equipment to be used inside the buildings.

Written operating records for the RH-TRU units are, or will be, maintained by WO staff and are, or will be, retained in hard copy form for at least three years.

CH-TRU Waste and LLW

Container Information. CH-TRU wastes are packaged in metal boxes or DOT-approved metal drums. In Building 7823, wastes may also be packaged in metal cask overpack containers. Mixed LLW (high-activity and low-activity) are packaged in DOT-approved metal drums. The choice of the container for storage purposes depends upon the size of the CH-TRU waste. Compactibles such as paper and rags and small laboratory equipment or wastes are placed in DOT-approved drums (typically 55-gal capacity). Some of these smaller containers may be overpacked into drums varying from 75-gal to 110-gal. Large glove-box parts, which are typically CH-TRU waste, are placed in DOT-approved metal boxes of varying sizes. Mixed LLW may be stored in DOT-approved metal drums (30-gal to 55-gal capacity). Liquids would generally be stored in lined drums, while solids would not. Choice of container for mixed LLW focuses on waste type, form, and compatibility. The containers may be vented for safety.¹

Movement of Containers. The waste transported to the CH-TRU buildings is unloaded from flatbed, closed-body trucks using a forklift manned by trained operators (see Attachment 4). The drums are placed on pallets to keep them off the floor and away from any accumulated liquids². The containers will be stacked as many as three³ high when necessary to maximize storage space. In general, three to four drums will be placed on a pallet, depending on the size of the drums. Waste containers are always kept closed except when wastes are to be sampled, added, or transferred.

¹ Venting may be used to relieve the pressure from the build-up of gases (mostly hydrogen) caused by the deterioration of the contents (polybags, etc) due to the radioactivity levels.

² Not required when placed in overpack containers in accordance with III.F.2(f).

³ Past experience at the CH-TRU units have shown that triple stacking does not represent an operational safety concern. Required container inspections are completed using rolling ladders to inspect the uppermost containers.

Container Inspection. Regularly scheduled inspections are performed by WM personnel. Container inspections focus on the presence of leaks, drum deterioration, equipment malfunctions, structural deterioration, operational errors, and discharges that could cause or lead to releases of hazardous waste to the environment and/or threaten human health. WM personnel perform daily inspections when waste is being moved and weekly or monthly inspections (as radiation levels permit) of the container storage areas when operating. The inspection parameters and schedules are identified in Table 3-2. Inspection log sheets are completed during the inspection. After the inspection is completed, the CH-TRU and/or mixed LLW log sheets (depending on the type of waste in storage) are filed in the inspection log books maintained at ORNL. The log sheets are maintained for at least three years. Also, routine radiation background surveys are performed at the waste storage units by RP personnel.

If inspections reveal that nonemergency maintenance is required, the maintenance will be completed as soon as possible to preclude further damage and reduce the need for emergency action. If a hazard is imminent (or already has occurred during inspection or between inspections), remedial action will be initiated immediately. Corrective actions will be documented on the inspection log sheets.

If an emergency occurs involving the release of hazardous or radioactive materials to the environment, efforts will be made to contain and remove the hazard and subsequently decontaminate the affected area. Further details are provided in Attachment 5 of this document.

Management Practices. CH-TRU and high-activity LLW is packaged in drums or boxes by the generator. When a drum is full, the plastic bag is sealed at the top, and the lid is put in place and sealed. Drums may be vented for safety. The metal lid is secured using a metal band when the boxes or drums are filled. A radiation tag giving the results of the radiation survey is attached to the container. This information, along with other appropriate waste data, is entered by the generator and/or RP technician on the waste generator formset (Form UCN-2109 or equivalent). The container and copies of the formset are received by WO personnel. A unique number which identifies and allows tracking of the container throughout the waste management process is required to be marked on the container.

Shipments of wastes from off-site generators will be processed through the ORNL receiving area upon arrival at ORNL. The waste shipment and documentation are reviewed for completeness and accuracy. The data package is reviewed to verify the request for storage or disposal form and log sheets for packaging TRU waste. A radiation tag giving the results of the radiation survey is attached to the container by RP personnel.

Containers of waste from off-site generators will have an identifying marking such as a bar code sticker with the identification number on the container for tracking purposes. If no discrepancies are found, the WO supervisor will sign the formset. If discrepancies are found, the WO staff will contact the generator to resolve those discrepancies (see Attachment 1). Data pertaining to TRU waste handling, volumes, storage location, etc., are maintained on a computer tracking system.

Low-activity mixed LLW is generally packaged in 30-gal or 55-gal DOT-approved drums by the generator. However, some repackaging or recontainerization of mixed LLW may be conducted at the storage units by WM personnel. WM operators ensure that waste will be compatible with the container to be used for repackaging. Containers are maintained in a closed condition unless wastes are being sampled, added, or transferred. Appropriate hazardous waste labels and radiation tags (see Appendix C-5) are placed on the drums within approximately one week of receipt. The appropriate waste information (name, waste code) is entered on the hazardous waste label, on the request for storage or disposal of waste materials form (UCN-2109 or equivalent), and on a computer tracking system. Unique drum numbers are assigned to all low-activity mixed LLW drums to facilitate container tracking.

Maximum capacities for the CH-TRU and waste examination units (Buildings 7572, 7574, 7576, 7577, 7580, 7823, 7824, 7842, 7878, and 7879) are given in Table 7-1.

The containers (CH-TRU or mixed LLW) are, or will be, placed on pallets to keep them off the floor and away from any accumulated liquid. The containers are stacked as much as three high on pallets to maximize the storage space. Once the containers are placed in the CH-TRU units, personnel access is limited because of the radiation levels and the need to keep exposures to ALARA levels. The high-activity LLW and TRU containers are placed in different sections of the buildings. The TRU storage areas are to be roped off or otherwise marked to keep personnel away from the TRU drums or boxes. Since inspection of each CH-TRU drum or box is expected to be kept to a minimum (ALARA), limited aisle space is needed. The storage areas have an aisle for the passage and maneuver of forklifts through the center of the storage bay. Also, the aisles are wide enough (generally 28 in. wide) to permit manned access for inspections of all waste containers.

Written operating records for the CH-TRU units are, or will be, maintained by WO personnel and are retained in hard copy form for at least three years.

WPF Units

The units associated with the WPF are not used for long term storage of mixed waste. They are used to support processing, including characterization and repackaging of waste, currently stored in the other units authorized under this permit, for disposal off-site. Waste is transferred to the WPF units from the other units in this permit for temporary storage while conducting activities to prepare waste for off-site disposal.

Transfer of the containers into the Facility will be performed in accordance with operating procedures. Trained operators will operate handling equipment (e.g., trucks, fork lifts, etc.). Containers holding hazardous waste at the Facility will be maintained in good condition.

Regular inspections of the container storage areas will be performed by operations personnel to look for the presence of spills or leaks, container deterioration, equipment malfunctions, and operational errors. The inspection parameters, schedules, and records are identified in Attachment 3 of this permit. Adequate aisle spacing will be maintained to facilitate movement of personnel performing inspections and the movement of containers without damage to adjacent containers. Spill response equipment will be located near the storage areas.

If inspections reveal that non-emergency maintenance is required, the maintenance will be completed as soon as possible to preclude further damage and reduce the need for emergency action. If a hazard is imminent (or observed during an inspection or between inspections), remedial action will be taken. Corrective actions will be documented on an inspection record. If an emergency occurs involving the release of hazardous materials to the environment, efforts will be made to contain and remove the hazard and subsequently decontaminate the affected area. Further details are provided in Attachment 5 of this permit.

The types of waste containers to be received at the Facility, as described previously, consist of drums and boxes for CH waste and concrete casks for RH waste. These waste containers will be delivered to the Facility by another DOE contractor, and externally inspected and surveyed prior to their acceptance by the Facility.

Process Flow for CH Waste

The following is a description of the activities that will be performed during each major step of the CH solid waste processing operation as it relates to RCRA waste management.

Waste Receipt. CH drums and boxes will be received at the Contact Handled Staging Area (CHSA) facility or at the Contact Handled Marshalling Building (CHMB). Drums up to 110-gal capacities and boxes of various dimensions will be externally inspected and surveyed prior to acceptance. The containers will be sorted and moved to the appropriate staging area in preparation of waste processing.

NDA and NDE. Non-destructive examination (NDE) and non-destructive assay (NDA) will be performed on each 55-gallon drum (and drum overpacks up to 85-gal capacity) received. NDA and NDE will be performed in mobile systems located adjacent to the CHSA (an enclosed 50' x 80' metal structure). This initial assay will determine the subset of drums which can be certified for disposal as low-level radioactive waste (LLW). NDE will also provide information to aid in the sorting and segregating of RCRA waste materials. Drums identified as containing liquids by NDE will be placed on pallets with built-in secondary containment.

The drums requiring processing will then enter the Facility and be staged. Incoming boxes and 110-gallon drums will not be assayed upon receipt, but will be moved directly to the box breakdown area. Drums that meet the definition of LLW will be prepared for shipment off-site.

Container Storage Area (CSA). Portable waste storage units designated as part of the CSA, are each nominally 10' wide X 20' long. These units, which are stationary during the CH campaign, are used to temporarily store mixed waste. Additionally, as part of the CSA, an enclosed metal building (30.5' x 20'), the MEB, will be used for storage of drums and boxes of mixed waste. Additionally, the portable waste storage units may include transport units, referred to as flatbed trucks that will be used to ship the waste. These trucks have a roll back cover that will ensure that the containers are covered unless waste is being added or removed from the storage unit or when the cover is pulled back to allow access for inspections and will only be used for solid LLMW that is packaged in DOT compliant containers and ready for shipment.

Contact Handled Marshalling Building (CHMB). The CHMB is a metal sided building nominally 55-ft wide, 140-ft long (7700 ft²) and 32-ft high at the peak. This unit will be used to store CH-TRU, LLW, or LLM waste to facilitate processing or in preparation for shipment of waste off-site to an approved TSDF.

Drum Aging Criteria (DAC) Area. Portable waste storage units designated for the Drum Aging Criteria are nominally 10' wide x 25' long to 10' wide x 40' long. These units which are stationary during CH campaign, are used to temporarily store mixed waste.

There are additional portable waste storage units, each nominally 10' wide X 40' long, that are also designed for the DAC Area. These containers, which are stationary during the CH campaign, are used to temporarily store mixed waste to facilitate off-site waste shipment. Additionally, the portable waste storage units may include transport units, referred to as flatbed trucks that will be used to ship the waste. These trucks have a roll back cover that will ensure that the containers are covered unless waste is being added or removed from the storage unit or when the cover is pulled back to allow access for inspections and will only be used for solid LLMW that is packaged in DOT compliant containers and ready for shipment.

The DAC Area will also include storage of a maximum of 10 over-packed concrete casks or packaged 72B canisters in the covered 30 ton crane bay outside the first floor of the Waste Processing Facility. Both the casks and canisters are configured to contain no more than three 55-gallon containers of waste. The wastes inside the concrete casks are primarily solid in form. The concrete casks are in steel overpacks lined with a 6-mil polyethylene bag, which will provide two layers of secondary containment for the contents of the casks. The packaged 72B canister waste will have no liquids and be packaged into 55-gallon DOT compliant drums within the 72B canister which is 1/4" steel.

The DAC Area will also employ the use of a roof frame that attaches to the top of cargo containers. The width of the roof systems can range from 12' to 24' wide, and all units are 20' long. The roof unit is constructed of 14 gauge 2" structural steel tubing, covered with 12.5 oz, 24 mil UV-resistant polyethylene material. These covered storage areas, within the DAC Area, will be used to store DOT compliant macroencapsulated boxes of low-level mixed waste (LLMW). These containers will have no liquid waste. The roof systems will only be used in areas that have concrete or asphalt flooring. The macroencapsulated boxes have "feet" that elevate the boxes off the ground 4", so the containers are not in contact with any rainwater runoff.

Waste Retrieval. Drums and boxes will enter either the glove box lines or the box break down area (BBA) through airlocks. Waste will be tipped or removed from drums manually through ports in the glove box line. A drum tipper will aid operators in emptying contents onto a sort table. Waste will be removed from boxes and drums in the box breakdown.

Sort/Segregation. Material will be manually sorted and segregated within the glove boxes and/or BBA area to segregate materials that are LLW, segregate hot-spot materials, and separate sources of high activity from other waste materials.

Treatment. Any liquids or elemental mercury found will be removed from the drum/box, and solidified or amalgamated in appropriate containers within secondary containment (see Attachment 8 for more detail). LLMW will be macroencapsulated in either boxes or drums to meet LDR requirements (see Attachment 8 for more details).

Certification/Transport. Processed CH-TRU waste will be characterized as required. Final waste forms will be certified in accordance with appropriate disposal site Waste Acceptance Criteria.

7-1c (2) Storage of Incompatibles, Ignitables, and Reactives

RH-TRU Units. High-activity wastes that are incompatible, ignitable, or reactive will not be stored in the RH-TRU waste storage units. The RH-TRU wastes that will be stored in these units are, or will be, solids such as metal, plastic, cloth, paper, and glass materials. The mixed waste stored in these units is classified as hazardous due to the presence of RCRA metals, primarily lead and mercury, in some of the containers. Additional information is provided in Attachment 1, Waste Analysis Plan.

The RH-TRU units may be used to store low-activity mixed LLW which may be ignitable and/or incompatible. These wastes will be segregated by means of portable dikes or other means of segregation.

CH-TRU Units. Reactive waste will not be stored at the CH-TRU units. However, ignitable and incompatible waste may be stored at the CH-TRU units. The container storage areas are located more than 50 ft from the property line.

Any incompatible wastes that might be stored in the CH-TRU units will be segregated by means of portable dikes or other means of segregation. For additional information on waste characteristics, see Attachment 1.

WPF Units. Reactive wastes will not be stored at the WPF units. However, ignitable and incompatible waste may be stored at the WPF units. The container storage areas are located more than 50 ft. from the property line. Any incompatible wastes that might be stored in the WPF units will be segregated by means of portable dikes or other means of segregation. For additional information on waste characteristics, see Attachment 1.

Attachment 7 References

L. D. Bates, *Radioactive Solid Waste Storage and Disposal at Oak Ridge National Laboratory, Description and Safety Analysis*, ORNL/TM-8201, Martin Marietta Energy Systems, Inc., Oak Ridge Natl. Lab., 1983.

Table 7-1-1. Building Drawings

Figure Number	Building Number	Building Name	Drawing Title
7-1-1	7855	RH-TRU Retrievable Concrete Cask Storage Facility	Storage Facility for High Radiation Level Waste - Floor Plan
7-1-2	7855	RH-TRU Retrievable Concrete Cask Storage Facility	Oak Ridge National Laboratory TRU Retrievable Storage Facilities - Building 7855
7-1-3	7883	RH-TRU Storage Bunker	RH-TRU Waste Storage Bunker - Foundation & Floor Plan
7-1-4	7883	RH-TRU Storage Bunker	RH-TRU Waste Storage Bunker Floor Plan - Piping
7-1-5	7823	Staging Facility for CH-TRU Waste	As-built Bldg. 7823 - Solid Waste Storage Area - SWSA 5
7-1-8	7879	TRU/LLW Staging Facility	TRU/SLLW Staging Fac. - SWSA 5 - Floor Plan
7-1-9	7879	TRU/LLW Staging Facility	TRU/SLLW Staging Fac. - SWSA 5 - Foundations Plan, Sections and Details
7-1-10	7572	CH-TRU Waste Storage Facility	CH-TRU Storage Facility - Building Slab & Foundation Plan
7-1-11	7572	CH-TRU Waste Storage Facility	CH-TRU Storage Building - Building Plan
7-1-12	7574	NFS TRU Storage Facility	NFS Waste Storage Facility - Building Slab & Foundation Plan
7-1-13	7574	NFS TRU Storage Facility	NFS Waste Storage Facility - Foundation Sections & Details - Sheet 1
7-1-24	WPF	WPF Units	TRU/Alpha Waste Treat. Proj. 1 st Floor Plan, General Arrangement
7-1-25	WPF	WPF Units	TRU/Alpha Waste Treat. Proj. 2nd Floor Plan, General Arrangement
7-1-26	WPF	WPF Units	TRU/Alpha Waste Treat. Proj. Site Grading Plan, Second Stage Construction
7-1-27	WPF	WPF Unit	TRU/Alpha Waste Treat. Proj. Contact Handled Marshalling Building Floor Plan, General Arrangement
7-1-28	WPF	WPF Unit	TRU/Alpha Waste Treat. Proj. Contact Handled Marshalling Building Foundation Material at EL-777 ft-9"

7-1-1

Class 1 Modification, Dated: 10/29/02

Temporary Authorizations - Dated: 3/6/06 and 8/17/07

Class 2 Modification - Dated: 1/25/07

8

7

2

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C

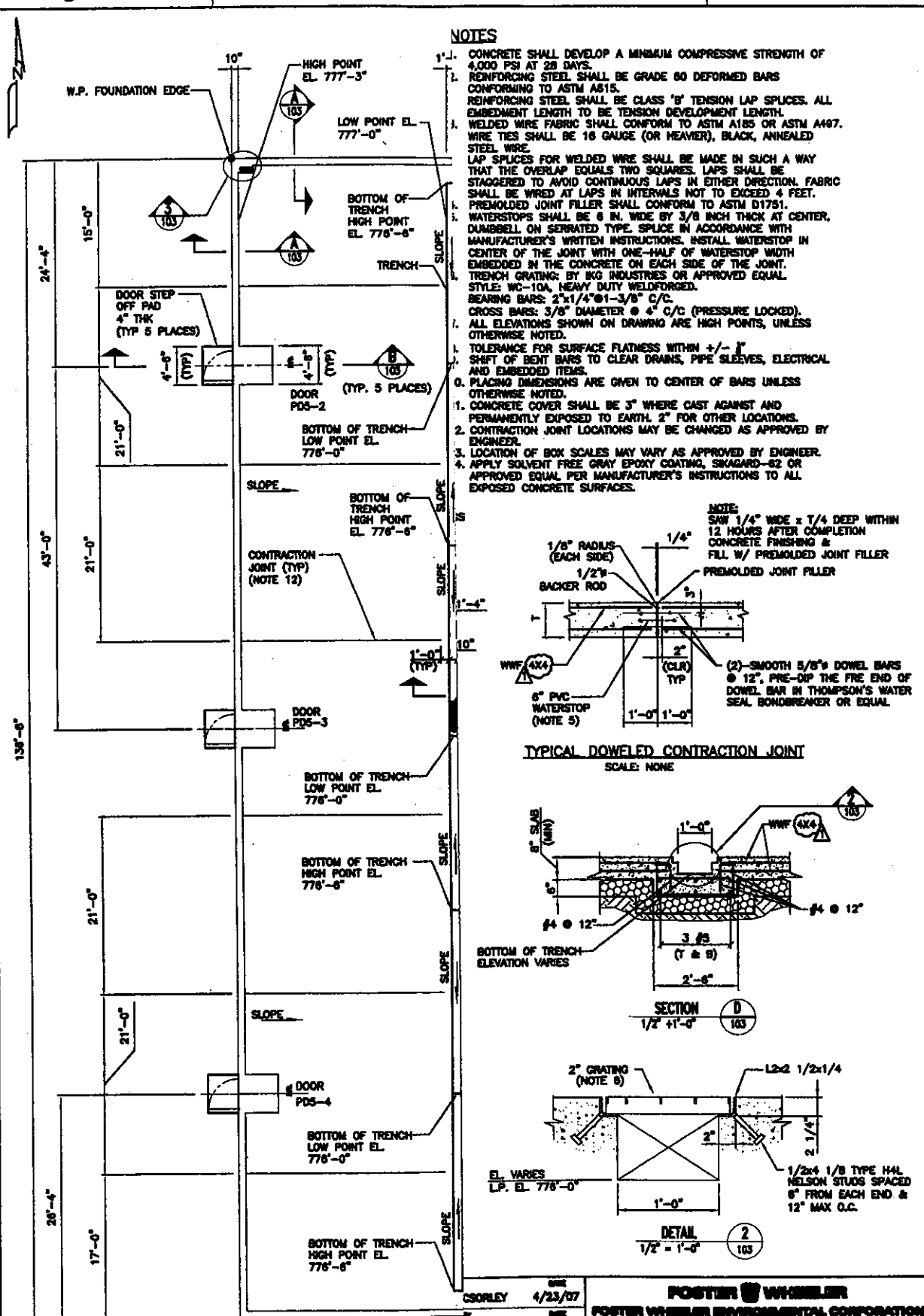
C

B

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A



TEMPORARY AUTHORIZATION - DATED: 8/17/07

FLEWEE T-CH-FW-D-SC-103

APPENDIX 7-2
CONTAINER STORAGE SECONDARY
CONTAINMENT CALCULATIONS

APPENDIX 7-2

Building 7823

Total Available Containment per Pallet^a:

$$\begin{array}{rcl} (4.125 \text{ ft} \times 4.375 \text{ ft} \times 0.4583^b \text{ ft}) & = & 8.2079 \text{ ft}^3 \\ \text{or} & & \text{or} \\ (8.2079 \text{ ft}^3 \times 7.48 \text{ gal/ft}^3) & = & 62 \text{ gal per pallet} \end{array}$$

Maximum Containment Capacity Based On Containment Pallets:

$$\begin{array}{rcl} \text{Maximum Number of Pallets for Building 7823}^c & = & 378 \\ (378 \text{ pallets} \times 62 \text{ gal/pallet}) & = & 23,436 \text{ gal} \end{array}$$

Building 7879

Total Available Diked Storage Area:

$$\text{Dike Capacity} = 48 \text{ ft} \times 78 \text{ ft} \times .25 \text{ ft} = 936 \text{ ft}^3$$

Maximum Diked Storage Capacity:

$$\begin{array}{rcl} 936 \text{ ft}^3 \times 7.48 \text{ gal/ft}^3 & = & 7,001 \text{ gal} \\ \text{Minus } 104 \text{ pallets @ } 12 \text{ gal/pallet} & = & \underline{(1,248 \text{ gal})} \\ & = & 5,753 \text{ gal} \end{array}$$

Total Available Containment per Pallet^a:

$$\begin{array}{rcl} (4.125 \text{ ft} \times 4.375 \text{ ft} \times 0.4583^b \text{ ft}) & = & 8.2079 \text{ ft}^3 \\ \text{or} & & \text{or} \\ (8.2079 \text{ ft}^3 \times 7.48 \text{ gal/ft}^3) & = & 62 \text{ gal per pallet} \end{array}$$

Maximum Containment Capacity Based On Containment Pallets:

$$\begin{array}{rcl} \text{Maximum Number of Pallets for Building 7879} & = & 312 \\ (312 \text{ pallets} \times 62 \text{ gal/pallet}) & = & 19,344 \text{ gal} \end{array}$$

^a See Figures 7-2-1 and 7-2-2 for a visual of the containment pallets.

^b The 0.4583-ft depth allows for volume displaced by the pallet's grating.

^c Excludes waste stored in overpack containers with 100 percent secondary containment.

Buildings 7572 and 7577

Total Available Diked Storage Area:

$$\text{Dike Capacity} = 140 \text{ ft} \times 50 \text{ ft} \times 0.5 \text{ ft} = 3,500 \text{ ft}^3$$

Maximum Diked Storage Capacity:

$$\begin{array}{rcl} 3500 \text{ ft}^3 \times 7.48 \text{ gal/ft}^3 & = & 26,180 \text{ gal} \\ \text{Minus 119 pallets @ 12 gal/pallet} & = & (1,428 \text{ gal}) \\ \text{Minus 50 boxes @ 12 gal/pallet} & = & \underline{(600 \text{ gal})} \\ & & 24,152 \text{ gal} \end{array}$$

Building 7842

Total Available Containment per Pallet^a:

$$\begin{array}{rcl} (4.125 \text{ ft} \times 4.375 \text{ ft} \times 0.4583^b \text{ ft}) & = & 8.2079 \text{ ft}^3 \\ \text{or} & & \text{or} \\ (8.2079 \text{ ft}^3 \times 7.48 \text{ gal/ft}^3) & = & 62 \text{ gal per pallet} \end{array}$$

Maximum Containment Capacity Based On Containment Pallets:

$$\begin{array}{rcl} \text{Maximum Number of Pallets for Building 7842} & = & 300 \\ (300 \text{ pallets} \times 62 \text{ gal/pallet}) & = & 18,600 \text{ gal} \end{array}$$

Building 7576

Total Available Diked Storage Area:

$$\text{Dike Capacity} = 100 \text{ ft} \times 50 \text{ ft} \times 0.5 \text{ ft} = 2,500 \text{ ft}^3$$

Maximum Dike Storage Capacity:

$$\begin{array}{rcl} 2,500 \text{ ft}^3 \times 7.48 \text{ gal/ft}^3 & = & 18,700 \text{ gal} \\ \text{Minus 115 boxes @ 12 gal/pallet} & = & \underline{(1,380 \text{ gal})} \\ & & 17,320 \text{ gal} \end{array}$$

^a See Figures 7-2-1 and 7-2-3 for a visual of the containment pallets.

^b The 0.4583-ft depth allows for volume displaced by the pallet's grating.

Total Available Containment per Pallet^a:

$$\begin{array}{rcl} (4.125 \text{ ft} \times 4.375 \text{ ft} \times 0.4583^b \text{ ft}) & = & 8.2079 \text{ ft}^3 \\ \text{or} & & \text{or} \\ (8.2079 \text{ ft}^3 \times 7.48 \text{ gal/ft}^3) & = & 62 \text{ gal per pallet} \end{array}$$

Maximum Containment Capacity Based On Containment Pallets:

$$\begin{array}{rcl} \text{Maximum Number of Pallets for Building 7576} & = & 375 \\ (375 \text{ pallets} \times 62 \text{ gal/pallet}) & = & 23,250 \text{ gal}^c \end{array}$$

Buildings 7574 and 7580

Total Available Diked Storage Area:

$$\text{Dike Capacity} = 80 \text{ ft} \times 50 \text{ ft} \times 0.5 \text{ ft} = 2,000 \text{ ft}^3$$

Maximum Dike Storage Capacity:

$$\begin{array}{rcl} 2,000 \text{ ft}^3 \times 7.48 \text{ gal/ft}^3 & = & 14,960 \text{ gal} \\ \text{Minus 95 boxes @ 12 gal/pallet} & = & \underline{(1,140 \text{ gal})} \\ & & 13,820 \text{ gal} \end{array}$$

Building 7878

Total Available Diked Storage Area:

$$\text{Dike Capacity} = 73 \text{ ft} \times 38 \text{ ft} \times 0.5 \text{ ft} = 1,387 \text{ ft}^3$$

Maximum Diked Storage Capacity:

$$\begin{array}{rcl} 1,387 \text{ ft}^3 \times 7.48 \text{ gal/ft}^3 & = & 10,375 \text{ gal} \\ \text{Minus 80 pallets @ 12 gal/pallet} & = & \underline{(960 \text{ gal})} \\ & & 9,415 \text{ gal} \end{array}$$

^a See Appendix 7-2-1 and 7-2-2 for a visual of the containment pallets.

^b The 0.4583-ft depth allows for volume displaced by the pallet's grating.

^c 23,250 gal capacity is based on using 62 gal capacity containment pallets. If 80 gal containment pallets are used, containment capacity will be 30,000 gal.

Building 7824

Total Available Containment per Pallet^a:

$$\begin{aligned} (4.125 \text{ ft} \times 4.375 \text{ ft} \times 0.4583^b \text{ ft}) &= 8.2709 \text{ ft}^3 \\ \text{or} & \\ (8.2709 \text{ ft}^3 \times 7.48 \text{ gal/ft}^3) &= 62 \text{ gal per pallet} \end{aligned}$$

Maximum Containment Capacity Based On Containment Pallets:

$$\begin{aligned} \text{Maximum Number of Pallets for Building 7824} &= 25 \\ (4 \text{ pallets} \times 62 \text{ gal/pallet}) &= 1,500 \text{ gal} \end{aligned}$$

Contact Handled Marshalling Building (CHMB)

Total Available Diked Storage Area:

$$\text{Dike Capacity} = 55 \text{ ft} \times 140 \text{ ft} \times 0.5 \text{ ft} = 3,850 \text{ ft}^3$$

Maximum Diked Containment Capacity:

$$3850 \text{ ft}^3 \times 7.48 \text{ gal/ft}^3 = 28,798 \text{ gal}$$

^a See Figures 7-2-1 and 7-2-2 for a visual of the containment pallets.

^b The 0.4583-ft depth allows for volume displaced by the pallet's grating.

APPENDIX 7-3

TYPICAL STRUCTURAL CONCRETE SPECIFICATIONS

1. APPLICABLE PUBLICATIONS

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

A. Federal Specifications (Fed. Spec.)

MMM-A-001993	Adhesive, Epoxy, Flexible, Filled (for Binding, Sealing, and Grouting)
TT-C-800A	Curing Compound, Concrete, for New and Existing Surfaces

B. American Society for Testing and Materials (ASTM) Publications

A 153-82	Zinc Coating (Hot-Dip) on Iron and Steel Hardware
A 185-79	Welded Steel Wire Fabric For Concrete Reinforcement
A 193-83a	Alloy-Steel and Stainless Steel Bolting Materials for High Temperature Service
A 615-82 w/Suppl S1	Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
A 675-82	Steel Bars, Carbon, Hot-Wrought. Special Quality Mechanical Properties
C 31-84	Making and Curing Concrete Test Specimens in the Field
C 33-84	Concrete Aggregates
C 39-83b	Compressive Strength of Cylindrical Concrete Specimens
C 42-84a	Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
C 78-84	Flexural Strength of Concrete (using Simple Beam with Third-Point Loading).
C 94-83	Ready-Mixed Concrete
C 143-78	Slump of Portland Cement Concrete

C 150-84	Portland Cement
C 172-82	Sampling Freshly Mixed Concrete
C 192-81	Making and Curing Concrete Test Specimens in the Laboratory
C 231-82	Air Content of Freshly Mixed Concrete by the Pressure Method
C 260-77	Air-Entraining Admixtures for Concrete
C 494-82	Chemical Admixtures for Concrete
C 618-84	Fly Ash and Raw or Calcined Natural Pozzolan for use as a Mineral Admixture in Portland Cement Concrete
C 827-82	Early Volume Change of Cementitious Mixtures
D 1190-80	Concrete Joint Sealer, Hot-Poured Elastic Type
D 1751-83	Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
C.	U.S. Army Corps of Engineers Handbook for Concrete and Cement
CRD-C-621	Corps of Engineers Specifications for Nonshrink Grout (1981)
D.	U.S. Department of Commerce, National Bureau of Standards (NBS), Product Standards
PS-17	Polyethylene Sheeting (Construction, Industrial, and Agricultural Applications) (1969)
E.	American Concrete Institute (ACI), Standards
ACI 211.1-81	Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete, Part 1
ACI 305R-77	Hot Weather Concreting, Part 2
ACI 306R-78	Cold Weather Concreting, Part 2
ACI 315-80	Details and Detailing of Concrete Reinforcement
ACI 318-83	Building Code Requirements for Reinforced Concrete

2. MATERIALS

Materials shall conform to referenced standards as noted below:

- A. Portland cement, ASTM C 150, Type I.
- B. Concrete aggregate, provisions and test methods of ASTM C 33. Maximum size aggregate per ACI 318.
- C. Water used in mixing the concrete shall be clean and free from injurious amounts of oil, acid, alkali, organic materials or other deleterious substances.
- D. Reinforcing bars shall be new billet-steel bars, ASTM A 615 with supplement S1, Grade 60. Plain bars specified for construction and contraction joints, ASTM A 675, Grade 45.
- E. Welded-wire fabric, ASTM A 185.
- F. Expansion joint material, premolded, nonextruding type, ASTM D 1751.
- G. Expansion joint sealer, poured elastic type, ASTM D 1190.
- H. Admixtures for air-entraining or as a water-reducing agent shall conform to ASTM C 260 and ASTM C 494, Type A. Calcium chloride shall not be used.
- I. Anchor bolts shall conform to ASTM A 193 and shall be 304 stainless steel.
- J. All miscellaneous steel embedded in concrete shall be galvanized per ASTM A153.
- K. Grout shall be nonshrink, nonstaining, and nonmetallic conforming to Corps of Engineering CRD-C-621 and shall show no shrinkage under ASTM C 827.
- L. Pozzolan shall conform to ASTM C 618 and shall be of one type. Pozzolan may be used but shall not exceed 20%, by absolute volume, of the total combined volumes of Portland cement and pozzolan. If the pozzolan is obtained from a different source during the work, the concrete mix shall be redesigned before approval of the substitute material.
- M. Epoxy adhesive shall conform to Fed. Spec. MMM-A-001993, epoxy-resin adhesive, Type I or II.
- N. Membrane-forming curing compounds shall conform to Fed. Spec. II-C-800A, white pigmented or nonpigmented as required. Nonpigmented compounds shall contain a fugitive dye.
- O. Vapor barrier shall be polyethylene sheeting conforming to Product Standard PS 17, not less than 6-mil nominal thickness.
- P. Waterstops shall be PVC manufactured from virgin polyvinyl chloride or rubber, and shall have adequate tensile strength, elongation, resistance to

chemicals and aging, and other properties needed to ensure good performance.

3. STORAGE OF MATERIALS

- A. Cement and aggregate shall be stored to preclude deterioration or intrusion of foreign material. Reinforcing steel shall be stored under cover and protected from rust, oil, grease, or distortion. Only materials needed for immediate use shall be removed from storage.
- B. No material which has deteriorated or which has been damaged shall be used for concrete.

4. CONCRETE PROPORTIONS AND CONSISTENCY

- A. Proportions of cement, aggregate, and water for concrete shall produce a minimum compressive strength of 4000 psi at 28 days unless otherwise indicated. Concrete mixes shall be proportioned to provide the workability needed during placement.
- B. Slump tests shall be in accordance with ASTM C 143. Tests shall be performed by the Contractor. Slumps for various phases of concrete work shall conform to the following:

<u>Types of construction</u>	<u>Slump in Inches</u>	
	<u>Max.</u>	<u>Min.</u>
Reinforced foundation walls and footings	5	2
Slabs and curbs	5	3
Walks	3	1.5

Concrete which fails to meet consistency requirements will be rejected.

- C. Concrete for foundations and exterior use shall contain 4.5% entrained air with a plus or minus tolerance of 1.5%. Tests for air content shall be performed by the Contractor.
- D. Contractor shall prepare and submit for approval a concrete mix design from trial mixes made especially for this project. Mix designs prepared more than 60 days from notice to proceed will not be accepted. Trial mixes having proportions, air content, and slump suitable for the work shall be based on ACI 211.1, using at least three different water-cement ratios which will produce a range of strength encompassing that required for the work. The mixes shall be designed for maximum permitted air and slump. For each water-cement ratio, at least three test cylinders for each test age shall be made and cured in accordance with ASTM C 192. They shall be tested at 7 and 28 days in accordance with ASTM C 39 or ASTM C 78, as applicable. From these test results, a curve shall be plotted showing the relationship between water-cement ratio and strength. For each strength of concrete, the maximum allowable water-cement ratio shall be that shown by these curves

to produce an average compressive or flexural strength 15% greater than specified.

5. MIXING AND PLACING CONCRETE

- A. Mixing and placing of concrete shall be in accordance with ACI 318. Transit-mixed concrete shall be in accordance with ASTM C 94. The plant producing concrete, handling and manufacturing equipment, and transporting of concrete shall be subject to approval of the Contracting Officer. Each batch ticket shall indicate the amount of water that may be added to the mix on-site without exceeding the design mix water content.
- B. Concrete shall not be placed until forms, reinforcement, and other inserts have been approved by the Contracting Officer.
- C. Immediately before placing concrete, the compacted crushed stone under slabs in buildings shall be covered with a vapor barrier. Punctures and tears during subsequent operations shall be patched. Edges shall be lapped not less than 4 in. and ends not less than 6 in. Patches and lapped joints shall be sealed with a pressure-sensitive adhesive or pressure-sensitive tape, not less than 2 in. wide and compatible with the membrane.
- D. All concrete shall be consolidated by vibration, so that the concrete is thoroughly worked around the reinforcement, around embedded items, and into corners of forms, eliminating all air or stone pockets which may cause honeycombing, pitting, or planes of weakness. Internal vibrators shall have a minimum frequency of 8000 vibrations per minute and sufficient amplitude to consolidate the concrete effectively. They shall be operated by competent workmen. Use of vibrators to transport concrete within forms shall not be allowed. Vibrators shall be inserted and withdrawn at points approximately 18 in. apart. At each insertion, the duration shall be sufficient to consolidate the concrete but not sufficient to cause segregation, generally from 5 to 15 s. A spare vibrator shall be kept on the job site during all concrete placing operations.
- E. Curing of concrete shall be in accordance with ACI 318. The recommendation of ACI 305R and ACI 306R shall be implemented when hot or cold weather conditions exist, as defined therein. Concrete surfaces to which a protective coating is to be applied shall be cured by a curing agent approved by the coating material manufacturer.

6. FORMWORK

- A. Formwork shall conform to ACI 318. Earth cuts shall not be used as forms.
- B. Wood forms for exposed surfaces of concrete shall be of plywood or other dressed wood material and shall be free from knots, warps, breaks, or other defects likely to cause irregular surfaces.
- C. Metal forms shall be free from irregularities, dents, and sags.

- D. Form ties shall be snap-off type with ends terminating 1 in. below finished concrete surface.
- E. Edges and corners shall have chamfer strips placed in forms to bevel all edges and corners, except the top edges of walls and slabs which are to be tooled and edges which are to be buried. Equipment bases shall have formed beveled edges for all vertical and horizontal corners unless specifically shown otherwise on the drawings. Unless otherwise noted, bevels shall be 3/4 in. wide.
- F. The Contractor shall be responsible for design of formwork, safe practice in removing forms and shoring, and placing adequate reshores.

7. JOINTS AND EMBEDDED ITEMS

- A. Construction joints, contraction joints, expansion joints, sleeves, anchors, and other embedded items shall be provided as shown on the drawings and shall conform to ACI 318.
- B. Contraction joints shall be grooved with wood or metal molds or may be sawed after concrete has obtained its initial set but prior to cracking.
- C. Waterstops shall be installed so as to form a continuous watertight diaphragm at all construction, contraction, and expansion joints. Adequate provision shall be made to support and completely protect the waterstops during the progress of the work. Splices shall be made in conformance with the recommendations of the waterstop manufacturer. All waterstops shall be a minimum 6 in. wide by 1/4 in. thick. Lap splices shall be 6-in. minimum length.

8. REINFORCEMENT STEEL

- A. Hooks, bends, cleaning, and placement of reinforcement and splices in reinforcement shall conform to ACI 318.
- B. Unless otherwise indicated on the drawings, minimum concrete protection for reinforcement shall conform to ACI 318.
- C. The Contractor shall notify the Contracting Officer when reinforcement forms and other inserts are set and ready for inspection.

9. FINISHES

- A. Immediately after removal of forms, cut off fins and bulges, remove ties, fill depressions and internal tie holes with 1:2 mix of sand and cement mortar, and repair honeycombing and defective surfaces. Exposed surfaces shall be repaired by cutting out defective concrete to form dovetail joints. Color and texture shall match surfaces of adjacent concrete of previous pours. Apply wood float finish to tops of walls not covered with additional concrete.
- B. Surface of concrete on grade (other than floor slabs) shall be screeded to proper level and shall be finished with a wood float finish. Immediately after

the concrete has received a float finish, it shall be given a coarse transverse scored texture by drawing a broom or burlap belt across the surface.

- C. Surface of floor slabs shall be brought to proper level by screeding and shall be floated by hand and/or by machine to a smooth, hard finish. When concrete has hardened so that water and fine material will not be worked to the surface, it shall be smoothed with a steel trowel to a finish with a uniform surface within a tolerance of 1/8 in. in 10 ft. After the surface becomes relatively hard, it shall be burnished with steel trowels to a hard, dense finish free from blemishes.

10. CURING

- A. Curing of concrete shall be done in accordance with ACI 318.
- B. Concrete surfaces from which forms are removed within six days after pouring shall be sprayed with water during the curing period as frequently as drying conditions may require or protected by suitable temporary coverings. Coverings shall be of a type that will not stain or discolor finished concrete surfaces.
- C. Curing of exterior concrete shall be by an approved moist curing method or by spraying with an approved membrane-forming curing compound.

11. TESTS

- A. Tests for slump and air content shall be made by the Contractor in accordance with ASTM C 143 and ASTM C 231, respectively. Tests shall be performed with at least one measurement of slump and air content taken from each 50 cubic yards or fraction thereof of concrete placed daily.
- B. Unless otherwise specified, field samples shall be taken from each 50 cubic yards or fraction thereof of concrete made during the progress of work or when a day's concrete work does not amount to 50 cubic yards from each day's placement. One set of test cylinders (set: three cylinders unless otherwise specified) shall be made. One cylinder of each set will be broken at the age of seven days and the other two at 28 days. Samples from which compression test specimens are molded shall be secured in accordance with ASTM C 172.
 - (1) Molds shall be furnished by the Contractor, and testing will be performed by the Government. The Contractor shall furnish labor and facilities required for taking samples and the handling and storing of concrete test cylinders at the site of the work.
 - (2) Compression test specimens shall be made in accordance with ASTM C 31. Specimens taken to the laboratory for curing will be cured in accordance with ASTM C 192. Specimens will be tested in accordance with ASTM C 39.
 - (3) If the average strength of any 28-day test cylinder set falls below the required strength, further test samples (taken by the Contractor) may be

required by the Contracting Officer before the structure will be accepted. Core drilling and testing, if required, shall be in accordance with ASTM C 42. Such sampling and testing shall be at the expense of the Contractor. Evaluation of ASTM C 42 test results shall be in accordance with ACI 318.

12. SUBMITTALS

The Contractor shall submit data as listed on the attached Submittal Requirements sheet. The following defines in greater detail the data requirements of some of the items listed.

- A. The Contractor shall prepare and submit shop drawings in accordance with ACI 315.
- B. The following test and material certificates shall comply with the applicable specifications.
 - (1) Certificates of conformance shall be submitted for the following materials: Aggregate, air-entraining admixtures, water-reducing admixtures, nonshrink grout, and water stop.
 - (2) Mill test certificates of conformance shall be submitted for the following materials: Cement, reinforcement materials, and pozzolan.
 - (3) Concrete mix design, test reports, and plotted test results shall be in accordance with Paragraph 4.D.
- C. Submit evidence of satisfactory performance of admixture or evidence that admixture has been successfully employed by the producer for a period of at least three years and evidence that producer's admixture dispensing equipment and procedures are satisfactory.
- D. The Contractor shall furnish a statement giving the maximum nominal coarse aggregate size and the proportions of all ingredients that will be used in the manufacture of each strength of concrete. Aggregate weights shall be based on the saturated surface dry condition. The statement shall be accompanied by test results from an independent commercial testing laboratory, attesting that the proportions selected will produce concrete of the qualities indicated. No substitutions shall be made in the materials used in the work without additional tests to show that the quality of the concrete is satisfactory.
- E. The Contractor shall maintain a job site record showing the time and place of each concrete pour together with the truck delivery slip which certifies the contents of the pour.
- F. Submit moist curing method for exterior concrete.

CAULKING AND SEALING SPECIFICATIONS

SECTION 4 - ARCHITECTURAL

SECTION 4.0310 - CONCRETE FOR STRUCTURAL USE

PART 1 - GENERAL

This specification covers preparation and installation of Portland cement concrete for structural use.

PART 2 - WORKING DRAWINGS

The Seller shall prepare and submit working drawings showing dimensions, bar schedules, bending details, and stirrup spacings for approval by the Company.

PART 3 - MATERIALS

Materials shall conform with latest editions of referenced standards as noted below:

- A. Portland cement, ASTM C-150, Type I, except that with written approval of the Company, high-early-strength cement, ASTM C-150, Type III may be used.
- B. Concrete aggregate, provisions and test methods of ASTM C-33. Maximum size aggregate ACI 318.
- C. Water used in mixing the concrete shall be clean and free from injurious amounts of oil, acid, alkali, organic materials, or other deleterious substances.
- D. Reinforcing bars shall be new billet-steel bars, ASTM A-615, Grade 60, unless otherwise specified. Plain bars specified for construction and contraction joints, ASTM A-306, Grade 45.
- E. Welded-wire fabric, ASTM A-185.
- F. Expansion joint filler, premolded, nonextruding type, ASTM D-1751.
- G. Expansion joint sealer, poured elastic type, ASTM D-1190.
- H. Admixtures for air-entraining or as a water-reducing agent will be considered by the Company for use in qualified producer's ready-mix concrete when requested by the Seller. Air-entraining or water-reducing admixtures shall be established products, ASTM C-260 and ASTM C-494, Type A.

PART 4 - STORAGE OF MATERIALS

Cement and aggregate shall be stored to preclude deterioration or intrusion of foreign material. Reinforcing steel shall be stored under cover and protected from rust, oil, grease, or distortion. Only materials needed for immediate use shall be removed from storage.

No material which has deteriorated or which has been damaged shall be used for concrete.

PART 5 - CONCRETE PROPORTIONS AND CONSISTENCY

- A. Proportions of cement, aggregate, and water for concrete shall produce the specified minimum compressive strength at 28 days. The mixture shall work readily into corners and angles of forms and around reinforcement with the method of placing employed but without permitting segregation of material or collection of free water on the surface.
- B. Slump tests shall be in accordance with ASTM C-143. Tests shall be made by the Seller when specified on the drawings or required by the Construction Engineer. Slumps for various phases of concrete work shall conform to the following:

<u>Types of construction</u>	<u>Slump in Inches</u>	
	<u>Max.</u>	<u>Min.</u>
Reinforced foundation walls, footings and drainage structures	5	2
Plain footings, substructure walls, curbs and gutters	4	1
Slabs, beams, and reinforced walls	6	3
Pavements and walks	3	1.5

Concrete which fails to meet consistency requirements will be rejected.

- C. Concrete for exterior use shall contain entrained air and shall comply with the provisions of paragraph 4.2.5 of ACI 318.

PART 6 - MIXING AND PLACING CONCRETE

- A. Mixing and placing of concrete shall be in accordance with ACI 318. Transit-mixed concrete shall be in accordance with ASTM C-94. The plant producing concrete, handling and manufacturing equipment, and transporting concrete shall be subject to approval of the Company.
- B. Concrete shall not be placed until forms, reinforcement, and other inserts have been approved by the Company.
- C. Curing of concrete, cold and hot weather requirements shall be in accordance with ACI 318, ACI 604, and ACI 605.

PART 7 - FORMWORK

- A. Formwork shall conform to ACI 301, ACI 318, and ACI 347.
- B. Wood forms for exposed surfaces of concrete shall be of plywood or other dressed wood material and shall be free from knots, warps, breaks or other defects likely to cause irregular surfaces.

- C. Metal forms shall be free from irregularities, dents, and sags.
- D. Form ties shall be snap-off type with ends terminating 1 in. below finished concrete surface.
- E. The Seller shall be responsible for design and formwork, safe practice in removing and shoring, and placing adequate reshores.

PART 8 - JOINTS AND EMBEDDED ITEMS

- A. Construction joints, contraction joints, expansion joints, sleeves, anchors, and other embedded items shall conform to ACI 301, ACI 318, and ACI 347.
- B. Contraction and expansion joints shall be provided as specified.
- C. Contraction joints shall be grooved with wood or metal molds or may be sawed after concrete has obtained its initial set.

PART 9 - REINFORCEMENT STEEL

- A. Hooks, bends, cleaning, and placement of reinforcement and splices in reinforcement shall conform to ACI 318.
- B. Unless otherwise indicated on the drawings, minimum concrete protection for reinforcement shall conform to ACI 318.
- C. The Seller shall notify the Company when reinforcement, forms, and other inserts are set and ready for inspection.

PART 10 - FINISHES

- A. Slabs on grade (other than floor slabs). Surface of slabs on grade shall be screeded to proper level and shall be finished with a wood float finish unless otherwise noted.
- B. Surface of floor slabs shall be brought to proper level by screeding and shall be floated by hand or by machining to a smooth, hard finish. When concrete has hardened so that water and fine material will not be worked to the surface, steel trowel to a smooth finish with a uniform surface within a tolerance of 1/8 in. in 10 ft. After the surface becomes relatively hard, burnish with steel trowels to a hard, dense finish free from blemishes.
- C. Formed surfaces. Immediately after removal of forms, cut off fins and bulges, remove ties, fill depressions and internal tie holds with 1:2 mix of sand and cement mortar, and repair honeycombing and defective surfaces. Exposed surfaces shall be repaired by cutting out defective concrete to form dovetail joints. Color and texture shall match surfaces of adjacent concrete of previous pours. Apply wood float finish to tops of walls not covered with additional concrete.

PART 11 - CURING

- A. General. Curing of concrete shall be done in accordance with ACI 318.
- B. Formed Concrete. Concrete surfaces from which forms are removed within six days after pouring shall be sprayed during the curing period as frequently as drying conditions may require, and if necessary, protected by suitable temporary coverings. Coverings shall be of a type that will not stain or discolor finished concrete surfaces.
- C. Exterior Work. Curing shall be by an approved moist curing method or by spraying with an approved curing compound.
- D. Interior Floor Slabs. As soon after finishing as is possible without danger of damaging finished concrete surfaces, they shall be covered with one layer of Sisalkraft building paper, as manufactured by American Sisalkraft Company, laid in widest possible widths with laps at least 4 in. wide, continuously sealed with tape or glue and left in place for at least seven days. Surfaces while in the process of curing shall be protected from traffic by runways supported on smooth blocks. In accordance with the manufacturer's instructions, two coats of floor hardener shall be applied to interior floors not specified to receive a tile finish.

PART 12 - TESTS (for slump tests, see Section 5)

The following tests and material certifications shall be required on structural concrete.

A. Materials:

- (1) General Requirements: Submit, in duplicate, the following manufacturer's certificates complying with the applicable ASTM specifications.
 - a. Cement. Mill test certificate of conformance.
 - b. Aggregate. Certificate test report.
 - c. Air-entraining admixtures. Certificates of conformance.
 - d. Water-reducing admixtures. Certificates of conformance.
 - e. Reinforcement. Mill test certificate of conformance.
- (2) Additional Requirements:
 - a. Aggregates. Aggregates which fail to meet requirements of the applicable ASTM specification, but which have been shown by special tests conducted by an independent laboratory or through actual service to produce concrete of specified quality may be used after review and approval by the Company.
 - b. Water-reducing admixtures. Submit, in duplicate, evidence of satisfactory performance of admixture or evidence that admixture has been successfully employed by the producer for a period of at least

three years and evidence that producer's admixture dispensing equipment and procedures are satisfactory.

- c. Concrete. Unless otherwise specified, field samples shall be taken from each 50 cubic yards of concrete made during progress of work or when a day's concrete work does not amount to 50 cubic yards from each day's pour. One set of test cylinders shall be made. A set shall be three cylinders unless otherwise specified. One cylinder of each set will be broken at the age of seven days and the other two at 28 days. Samples from which compression test specimens are molded shall be secured in accordance with ASTM C-172.

Molds shall be furnished by the Seller, and testing will be performed by the Company. The Seller shall furnish labor and facilities required for taking samples and the handling and storing of concrete test cylinders at site of the work.

Compression test specimens shall be made in accordance with ASTM C-31. Specimens taken to the laboratory for curing will be cured in accordance with ASTM C-192. Specimens will be tested in accordance with ASTM C-39.

If the average strength of the 28-day test cylinders falls below the required strength, further test samples (taken by the Seller) may be required by the Construction Engineer before the structure will be accepted. Core drilling and testing, if required, shall be in accordance with ASTM C-42.

TYPICAL CAULKING AND SEALING SPECIFICATIONS

1. APPLICABLE PUBLICATIONS

The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent indicated by the references thereto:

A. Federal Specifications (Fed. Spec.):

TT-S-00227E Sealing Compound; Elastomeric Type, Multi-Component
(For Caulking, Sealing and Glazing in Buildings and Other
Structures)

2. GENERAL

Caulking, sealants and tapes specified herein are for use in interior and exterior joints and intersections of the corrugated metal roof and siding as required for waterproofing, weatherproofing, and light proofing. The terms "caulking" and "sealant" are synonymous, and either or both terms shall indicate the materials specified herein. No oil-based caulking shall be used.

3. MATERIALS

- A. Caulking compounds and sealants shall be delivered to the job site in sealed containers labeled to show the designated name, formula or specification number, lot number, color, date of manufacture, shelf life, curing time at standard conditions, manufacturer's directions, and name of manufacturer.
- B. Type A sealant shall be a two-component, rubber-based compound conforming to Fed. Spec. TT-S-00227. Type I, Class A compound shall be used for joints in horizontal surfaces, and Type II, Class A compound shall be used for joints in vertical surfaces.

4. SEALANT FORMULATION

- A. Colors of sealants shall be selected from the manufacturer's standard color range to match as closely as possible adjacent finish colors.
- B. Intended application: Each sealant formula brought to the job site shall be marked for the intended use. The sealant formulation shall be consistent with the desired in-service requirements indicated and with the following requirements for the intended application of elastomeric sealants.
 - (1) Normal curing schedules of sealants are acceptable, except that Type A sealant shall be formulated for a maximum curing time of 72 h.
 - (2) The lowest in-service temperature expected is -25° F.
 - (3) All sealants shall be nonstaining.

(4) Color-change limitation is applicable to all sealants.

(5) Durability when subjected to ultraviolet radiation is a requirement for any sealant to be exposed to sunlight.

C. Components of each formula shall be used only with that formula. Intermixing of components of different formulas will not be permitted. Thinners or other additives shall not be used to modify the formula.

D. Mixing shall be in accordance with instructions provided by the manufacturer of the sealants. Mixing equipment shall be thoroughly cleaned before mixing each batch.

5. SURFACE PREPARATIONS

Steel surfaces in contact with sealant shall be scraped and wire-brushed to remove loose mill scale. Dirt, oil, or grease shall be removed by solvent cleaning, and surfaces shall be wiped with clean cloths. Protective coatings on steel surfaces shall be removed by a solvent that leaves no residue.

6. APPLICATION

A. The ambient temperature shall be between 40° and 100° F when the sealant is applied.

B. The depth of sealant in a joint shall be equal to the width of the joint, but not more than ½ in. Backup material shall be provided as necessary to control the depth of sealant and shall be of suitable size so that when compressed 25 to 50%, the space will be filled. Backup material shall be rolled or pressed into place, avoiding lengthwise stretching.

C. Joints shall be tooled slightly concave after sealant is installed. Upon completion of the sealing work, each sealed joint shall have a smooth, even, tooled finish, flush with the edges of the sealing recess. Sealant shall not lap onto adjacent surfaces. Any sealant so applied as to prevent the painting of adjacent surfaces to a clean line, or with an excess of material outside the joint and feathered onto surfaces, shall be removed and properly reapplied.

7. CLEANING

The surfaces adjoining the caulked and sealed joints shall be cleaned of smears or other soiling resulting from the caulking and sealing application.

8. SUBMITTALS

The Contractor shall submit data listed on the attached Submittal Requirements sheet. The following defines in greater detail the data requirements of some of the items listed. Manufacturer's material statements certifying Type A sealants meet the requirements specified herein.

TYPICAL CAULKING AND SEALING SPECIFICATIONS

SECTION 4 - ARCHITECTURAL

SECTION 4.0790 - JOINT SEALERS

PART 1 - GENERAL

A. RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions, apply to work of this section.

B. DESCRIPTION OF WORK:

1. The extent of each form and type of joint sealer is indicated on drawings and by provisions of this section.
2. The applications for joint sealers as work of this section include, but are not limited to, the following:

- Concrete construction joints
- Floor joints
- Wall joints
- Flashing, fascia, and gravel stop joints
- Gasketing of assemblies.

3. Refer to section 5.00, 6.00, and 7.11 for joint sealers in heating and ventilating, piping, and electrical work; not work of this section.
4. General Performance: Except as otherwise indicated, joint sealers are required to establish and maintain airtight and waterproof continuous seals on a permanent basis, within recognized limitations of wear and aging as indicated for each application. Failures of installed sealers to comply with this requirement will be recognized as failures of materials and workmanship.

C. SUBMITTALS

1. Product Data: Submit manufacturer's product specifications, handling/installation/curing instructions, and performance tested data sheets for each elastomeric product required.
2. Certified Tests: With product data submit certified test reports for elastomeric sealants on aged performances as specified, including hardness, stain resistance, adhesion, cohesion or tensile strength, elongation, low-temperature flexibility, compression set, modulus of elasticity, water absorption, and resistance (aging, weight loss, deterioration) to heat and exposures to ozone and ultraviolet.

D. JOB CONDITIONS:

Weather Conditions: Do not proceed with installation of liquid sealants under unfavorable weather conditions. Install elastomeric sealants when temperature is in lower third of temperature range recommended by manufacturer for installation.

PART 2 - PRODUCTS

A. AVAILABLE MANUFACTURERS:

1. General: Manufacturers listed in this article include those known to produce the indicated category of prime joint sealer material, either as a nominally pure generic product or as an equivalent-performance modification thereof or proprietary product.
2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

3. Manufacturers of Elastomeric Sealants (Liquid):

Dow Corning Corp., Midland, MI
General Electric Co., Waterford, NY
Gibson-Homans Co., Cleveland, OH
Mameco International, Cleveland, OH
W.R. Meadows, Inc., Elgin, IL
Pecora Corp., Harleysville, PA
Products Research & Chem. Corp., Gloucester City, NJ
Sika Chemical Corp., Lindhurst, NJ
Sonneborn/Contech, Inc., Minneapolis, MN
Tremco, Inc., Cleveland, OH
Toch/Carboline Co., St. Louis, MO
Williams Products, Inc., Troy, MI

4. Manufacturers of Rubber and Polymeric Gaskets (Solid/Cellular):

Acme Highway Products Corp., Amherst, NY
D.S. Brown Co., North Baltimore, OH
Kirkhill Rubber Co., Brea, CA
F.H. Maloney Co., Houston, TX
Norton Co., Granville, NY
Rubatex Corp., Bedford, VA
Standard Products Co., Port Clinton, OH
Watson Bowman Assoc., Inc., Buffalo, NY
Williams Products, Inc., Troy, MI

5. Manufacturers of Joint Fillers/Sealant Backers:

Backer Rod Manufacturer & Supply Co., Denver, CO
Dow Chemical Corp., Midland, MI

Fel-Pro, Inc., Skokie, IL
Hercules, Inc., Middletown, DE
J&P Petroleum Products, Inc., Dallas, TX
Kirkhill Rubber Co., Brea, CA
W.R. Meadows, Inc., Elgin, IL
Rubatex Corp., Bedford, VA
Sonneborn/Contech, Inc., Minneapolis, MN
Williams Products, Inc., Troy, MI
Wodomont Products, Inc., Huntington Valley, PA

B. MATERIALS:

1. **General Sealer Requirements:** Provide colors as selected by Company from manufacturer's standard colors. Select materials for compatibility with joint surfaces and other indicated exposures and, except as otherwise indicated, select modulus of elasticity and hardness or grade recommended by manufacturer for each application indicated. Where exposed to foot traffic, select marketing materials of sufficient strength and hardness to withstand stiletto heel traffic without damage or deterioration of sealer system.
2. **Single-Component Polysulfide Sealant (1Ps-S):** Except as otherwise indicated, provide manufacturer's standard nonmodified, one-part, polysulfide-based, air-cured, elastomeric sealant, complying with either ASTM C 920 Type S Class 25, or FS TT-S-00230C, Class A; self-leveling grade/type where used in joints of surfaces subject to traffic, otherwise nonsag grate/type.
3. **Miscellaneous Materials:**
 - a) **Joint Primer/Sealer:** Provide type of joint primer/sealer recommended by sealant manufacturer for joint surfaces to be primed or sealed.
 - b) **Bond Breaker Tape (BB-Tp):** Provide polyethylene tape or other plastic tape as recommended by sealant manufacturer to be applied to sealant-contact surfaces where bond to substrate or joint filler must be avoided for proper performance of sealant. Provide self-adhesive tape where applicable.
 - c) **Sealant Backer Rod (S-BR):** Provide compressible rod stock of polyethylene foam, polyurethane foam, polyethylene jacketed polyurethane foam, butyl rubber foam, neoprene foam or other flexible, permanent, durable, nonabsorptive material as recommended by sealant manufacturer for back-up of and compatibility with sealant.

PART 3 - EXECUTION

A. INSPECTION:

Installer must examine substrates, (joint surfaces) and conditions under which joint sealer work is to be performed, and must notify Seller in writing of unsatisfactory

conditions. Do not proceed with joint sealer work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

B. JOINT PREPARATION:

1. Clean joint surfaces immediately before installation of gaskets, sealants or caulking compounds. Remove dirt, insecure coatings, moisture, and other substances which could interfere with seal of gasket or bond of sealant or caulking compound. Etch concrete and masonry joint surfaces as recommended by sealant manufacturer.
2. Prime or seal joint surfaces where recommended by sealant manufacturer. Confine primer/sealer to areas of sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. INSTALLATION:

1. Comply with manufacturer's printed instructions except where more stringent requirements are shown or specified and except where manufacturer's technical representative directs otherwise.
2. Set joint filler units at depth or position in joint as indicated to coordinate with other work, including installation of bond breakers, backer rods, and sealants. Do not leave voids or gaps between ends of joint filler units.
3. Install sealant backer rod for liquid-applied sealants, except where recommended to be omitted by sealant manufacturer for application shown.
4. Install bond breaker tape where indicated and where required by manufacturer's recommendations to ensure that liquid-applied sealants will perform as intended.
5. Employ only proven installation techniques which will ensure that sealants are deposited in uniform, continuous ribbons without gaps or air pockets, with complete "wetting" of joint bond surfaces equally on opposite sides. Except as otherwise indicated, fill sealant rabbet to a slightly concave surface, slightly below adjoining surfaces. Where horizontal joints are between a horizontal surface and vertical surface, fill joint to form a slight cove, so that joint will not trap moisture and dirt.
6. Install liquid-applied sealant to depths as recommended by sealant manufacturer but within the following general limitations, measured at center (thin) section of beads (not applicable to sealants in lapped joints).
 - a) For normal moving joints sealed with elastomeric sealants but not subject to traffic, fill joints to a depth equal to 50% of joint width, but neither more than 1/2 in. deep nor less than 1/4 in. deep.
 - b) For joints sealed with nonelastomeric sealants and caulking compounds, fill joints to a depth in range of 75% to 125% of joint width.
7. Spillage: Do not allow sealants or compounds to overflow from confines or joints, to spill onto adjoining surfaces, or to migrate into voids of exposed

finishes. Clean adjoining surfaces by whatever means necessary to eliminate evidence of spillage.

8. Recess exposed edges of exposed joint fillers slightly behind adjoining surfaces so that compressed units will not protrude from joints.

D. CURE AND PROTECTION

Cure sealants and caulking compounds in compliance with manufacturer's instructions and recommendations to obtain high early bond strength, internal cohesive strength and surface durability. Advise Seller of procedures required for cure and protection of joint sealers during construction period so that they will be without deterioration or damage (other than normal wear and weathering) at time of substantial completion. Cure and protect sealants in a manner which will minimize increases in modulus of elasticity and other accelerated aging effects. Replace or restore sealants which are damaged or deteriorated during construction period.

ATTACHMENT 8

TREATMENT MANAGEMENT AT THE WASTE PROCESSING FACILITY (WPF)

Attachment 8

Physical and Chemical Treatment at the Waste Processing Facility (WPF)

8-1 Solid Waste Treatment System

The Waste Analysis Plan (Attachment 1) provides information on the physical and chemical characteristics of the debris wastes to be treated in the WPF. The solid debris waste stream forms leaving the WPF macroencapsulation treatment process will have the same basic physical and chemical properties as the input waste streams, primarily solid wastes made up of ferrous metals, non-ferrous metals, other inorganics, cellulosic material, rubber, and plastics.

Small amounts (less than 1%) of liquids may be identified during processing at the WPF. Small amounts of mercury such as that in thermometers, manometers, or switches may also be identified. Treatment of liquids and elemental mercury prior to repackaging is required. CH and RH TRU wastes will not be treated to meet LDR requirements, as this is not required at Waste Isolation Pilot Project (WIPP), but the wastes will be treated to meet the WIPP Waste Acceptance Criteria (WAC). Any low-level mixed waste debris will be treated to meet LDR requirements or shipped to an approved treatment facility, as required. The process flow diagram for the debris waste treatment system (for both CH and RH wastes) is provided in Figure 8-1.

Macroencapsulation will be used as the waste treatment to ensure the final waste form is in compliance by completely encapsulating the debris within the container. The capacity of the macroencapsulation treatment process is 1000 cubic feet per hour.

8-1a Macroencapsulation

The treatment for low level mixed waste debris will utilize UltraTech International's Ultra-MacroEncapsulation technology, which is a standard 110 gallon, a B25 box, or other appropriately sized metal container with a polyethylene macro unit bonded to the interior of the container. Once a waste container or waste is loaded into the macroencapsulation container, the lid is placed on the container. The lid contains embedded wires that will be in contact with both the lid and the flanged area at the top of the container. The macroencapsulation unit is plugged into an approved power source and attached to the connector on the lid. The wires heat up and melt the localized area of polyethylene on the lid and the container unit, welding them together. Macroencapsulation will be performed on the 2nd floor of the Waste Processing Building in the Box Breakdown Area (BBA) or in a temporary macroencapsulation building (MEB) located behind the CHSA. Treatment will be conducted in the BBA if waste needs to be exposed (i.e., removed from current container) and containment for radiological contamination is required. The temporary building behind the CHSA that will be used to contain the macroencapsulation is an enclosed metal building (30.5' x 20') with a concrete floor, where only closed containers will be treated (i.e., no exposed waste). If treatment is conducted in this MEB, waste containers will be staged for treatment outside of a storage unit for less than 10 hours. If the waste containers cannot be macroencapsulated within this 10 hour period they will be returned to a permitted storage unit. The macroencapsulation treatment unit will be inspected using the inspection log sheet (Table 3-14, in Attachment 3) each day the unit is operating. Containers with liquids or mercury will not be macroencapsulated. Liquids will be

solidified/stabilized and mercury amalgamated before the final waste form is macroencapsulated.

Solidification/Stabilization. Solidification/Stabilization will be used to treat wastes containing RCRA liquids. Products such as Nochar Petro Bond, Nochar Acid Bond, or Nochar N962 (Refer to Appendix 8-2) will be used to solidify RCRA liquids based on the liquid composition. Nochar products are super-adsorbents used for treatment of oil and organic liquid wastes, aqueous waste streams and unknown mixtures, respectively. Solidification/stabilization of CH waste will be performed in either the glove box or the BBA, while operations associated with treatment of RH waste will be performed in the hot cell. The amount of liquid to be treated in any one batch shall not exceed one liter, or 50 gallons per day.

Amalgamation. The treatment for stabilizing elemental mercury is amalgamation, which combines physical and chemical conversion of mercury to a non-volatile metal. The amalgamation agent to be used is zinc, or a functional equivalent. Amalgamation of mercury from the CH waste will be performed in the glove box or the BBA, while the operations associated with the treatment of mercury from the RH waste will be performed in the hot cell. The amount of mercury to be treated in any one batch shall not exceed one cup, or 10 lbs per hour.

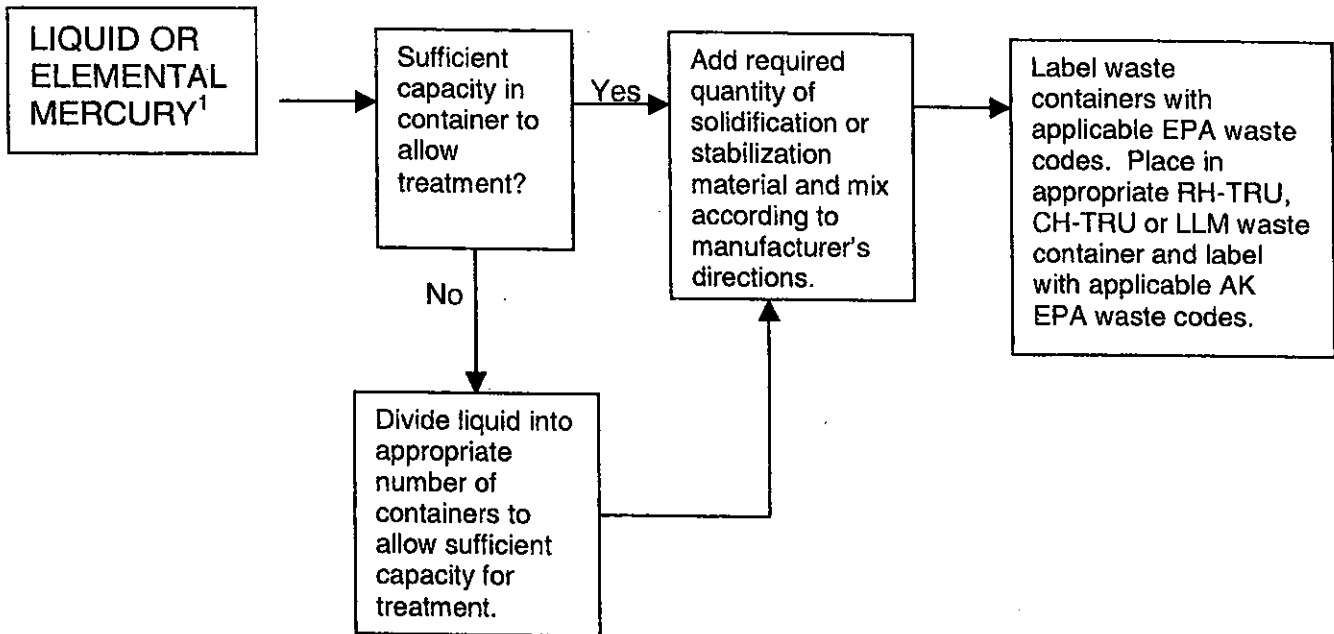
Amalgamation and Solidification treatment will be confined in the glove boxes or BBA (for CH waste), and hot cells (for RH), which are connected to a ventilation system with HEPA filters. No more than one treatment process will be conducted at the same time.

Treatment of liquids and elemental mercury will be conducted within secondary containment pans. In all cases, the liquid or mercury will be placed into a container with sufficient headspace to ensure no spills within the secondary containment pan and sufficient capacity to treat the waste in the container with the appropriate stabilizing agent. If there is more liquid in a container than allowed (one liter for liquid or one cup for mercury) then the excess liquid will be placed into another container for treatment. The secondary containment pans will be wiped clean between individual treatment operations to prevent mixing of incompatible wastes. Table 3-15 shows an example inspection checklist for the treatment process units which will be inspected each day the units are operating.

The treatment effectiveness of the solid waste unit is based on the treatment standards for hazardous debris as set forth in TN Rule 1200-1-11-10(3)(f), and for hazardous waste as set forth in TN Rule 1200-1-11-10(3)(a). The treatment standards include solidification for RCRA liquids (both contained and uncontained), and amalgamation for elemental mercury contaminated with radioactive materials to meet the WIPP WAC. Liquids will be solidified and mercury amalgamated before the LLW form is macroencapsulated. Any solid low-level mixed waste debris will be treated by macroencapsulation to meet LDR requirements or shipped to an approved treatment facility for treatment prior to disposal.

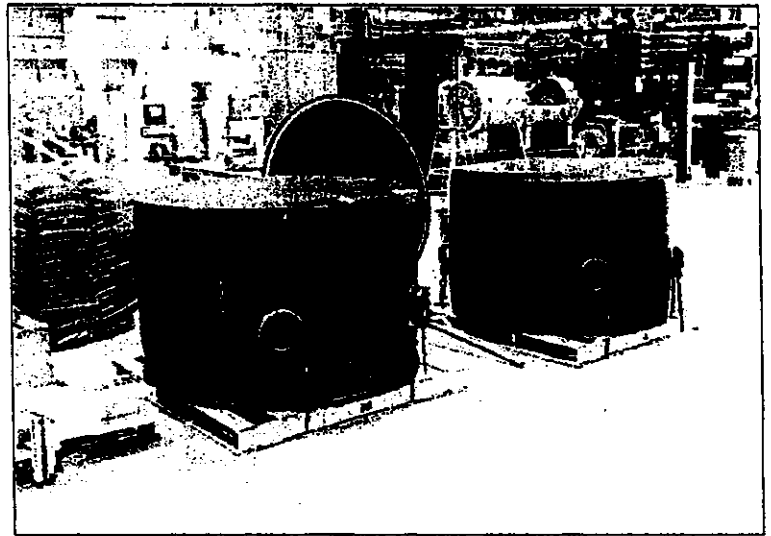
Figure 8-1

BLOCK FLOW DIAGRAM FOR PERMITTED TREATMENT



¹Document the following items on the inspection checklist:

- type and size of container
- amount of liquid
- amount of solidification/stabilization agent used
- applicable EPA waste codes
- inspection of secondary containment
- time of treatment
- spills or releases
- unanticipated reactions



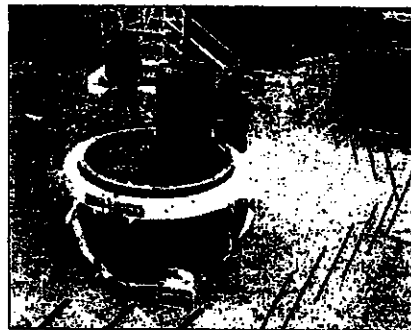
Sixty-three-inch HDPE macroencapsulation containers.



Ultra-MacroEncapsulation™

UltraTech's Macroencapsulation System offers a unique combination of flexibility, cost and ease of use.

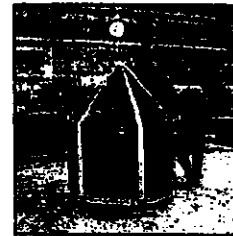
- Overall ease of use.
- Ability to temporarily seal the units for storage or shipping and permanently macroencapsulating the unit at a later date or location after inspection or shipment.
- Macro seal designed to hold 3 psi. and meet site specific performance criteria.
- Flexibility in design; units can be available in 55 gallon, 85 gallon, 110 gallon drums, 63" diameter and smaller polyethylene pipe of any length, SWB size and oversized to allow overpacking of SWB.
- The design allows top or vertical loading to assure maximum loading and minimal void space. Void spaces can be easily filled prior to closing.
- The Ultra-Macro technology can allow the polyethylene to be molded directly into steel drums, overpacks, boxes and other containers to offer the additional protection of steel for handling, stacking and fire rating.
- The Macro units can be designed to meet strong, tight container regulations, IP-2, Type A packaging standards, even High Integrity Container (HIC) standards.
- Custom sizes and shapes are available.



Process

Resistance wires are pre-installed in the lid of a polyethylene containment unit. The process is as follows:

1. Waste is loaded into the Ultra-MacroEncapsulation Containment Unit.
2. The lid is placed onto the containment unit. The lid contains embedded wires that are now in contact with both the lid and the flanged area at the top of the unit. The wires are connected a connection in the lid.
3. A compression weight is placed onto the lid.
4. An Ultra-MacroEncapsulation Control Unit is plugged into a 120 V power source and attached to the connector on the lid.
5. An operator pushes a button to start the process. The Control Unit allows a specific current to flow through the wires for a specific amount of time based on the wires resistance, length, etc. The wires heat up and begin to melt the localized area of polyethylene on the lid and containment unit welding them together. Once the process time is completed, the Control Unit shuts down



- and a green indicator light notifies the operator the process has been successfully completed.
6. Disconnect the power cord from the lid, remove the compression weights and allow the unit to cool before moving. A quick spin weld of a polyethylene plug seals off the connection area.

The process is designed to eliminate variables. The time, current, ohms, wire spacing, compression weight, etc. are all fixed to assure repeatability and successful sealing every time. Human error has been removed as a variable.



Temporary Shipping Closure Description:

To offer maximum flexibility for users of the Ultra-MacroEncapsulation Containment Units, UltraTech can provide a containment unit with an additional sealing option that would be temporary for on-site handling or for a strong, tight seal during shipments to a disposal facility where inspection may be required prior to macroencapsulating at that facility. This allows the waste to be safely contained upon placing the lid on the package, giving options to the time, date and place the macroencapsulation process is to take place.

Sizes and Shapes:

The Ultra-MacroEncapsulation process lends itself to a large variety of shapes and sizes. Containment Units can be made from conventional extruded pipe of varying diameters, lengths and thicknesses. Containment Units can also be custom molded to a specific size and shape using a rotational molding process. Units can be made cylindrical to function as an overpack for compacted drums. Units can be made into a 4' x 4' x 6' box shape to allow bulk loading of waste forms. Even larger boxes can be made to allow a standard waste box already loaded to be lowered into the "overpack box". Units can be made in larger shapes or more complex designs if required. Various thicknesses of the polyethylene from 1/4" to 1 1/2" can be produced.



Requirements for Macroencapsulation:

The requirements are minimal. One operator, one Ultra-MacroEncapsulation Control Unit, a source of 120 V, 50 amp power and a working area large enough to accommodate the specific size of the containment unit is all that is required. The Control Unit can be mounted on a rolling frame and be easily moved to each unit to be sealed.

The EPA considers Macroencapsulation a treatment (40 CFR 268.45) for some forms of waste such as debris waste and lead. Macroencapsulation is also a treatment being used for some forms of Mixed Radwaste. A viable treatment option for D&D projects and debris waste applications.

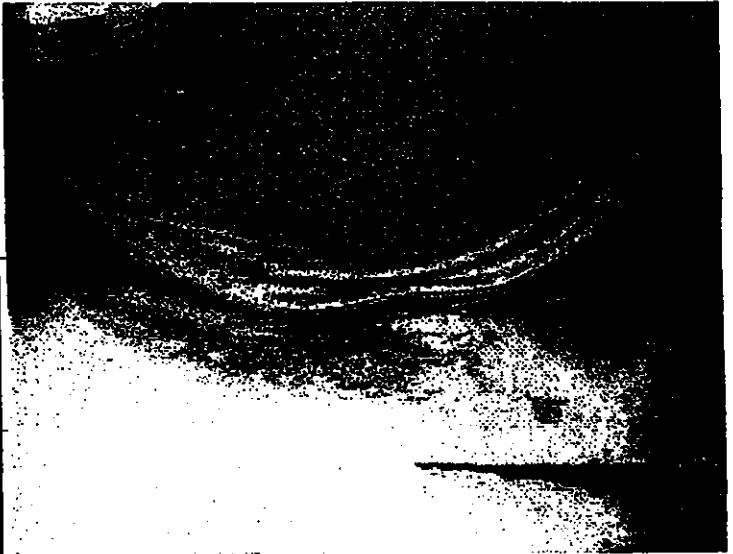
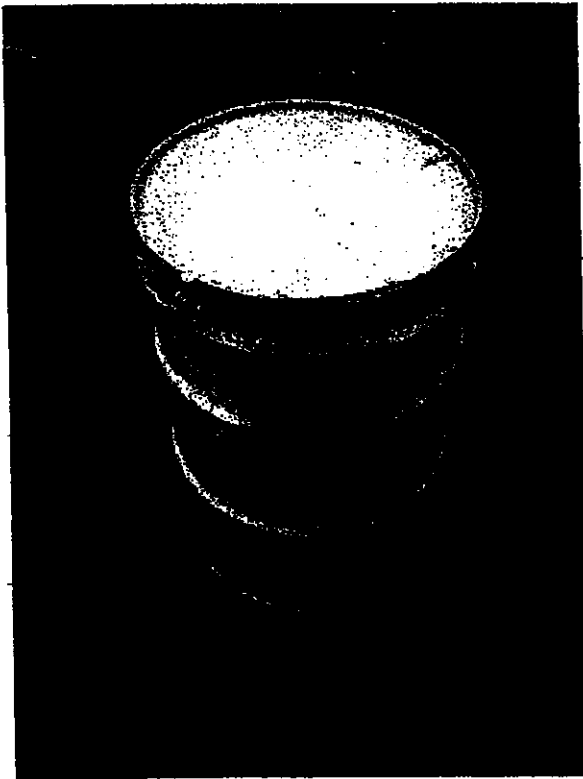
Ultra-MacroPack Test Summary

12-18-03

This e-mail is to briefly summarize UltraTech's recent developments and testing of an Advanced Container Concept. Based on previous discussions and interest we thought you might be interested.

The upper right photo shows the white, 400 lb. Ultra-MacroPack (Advanced Container Design) after surviving a 30' drop on its side onto a 1" thick steel plate with six other 400 lbs steel drums in a 7-pack configuration. The Ultra-MacroPack passed the drop test with minimal damage and no loss of contents. This photo is a close-up Ultra-MacroPack from the bottom photo below.

The upper left photo shows the white, 400 lb. Ultra-MacroPack (Advanced Container Design) after surviving a 30' drop on its flat bottom onto a 1" thick steel plate with six other 400 lbs steel drums in a 7-pack configuration. The Ultra-MacroPack passed the drop test with virtually no damage and no loss of contents.





The photo directly above shows the impact result of the 7-pack side drop from 30'. The UltraMacro-Pack is the center drum in the bottom row.

Objective: To develop a 55-gallon steel drum that would pass a 30' drop test and ultimately qualify as an Advanced Container to allow maximum loading of fissile material per container when shipped in a TRUPACT II at a cost less than \$ 1000 per container .

Ultra-MacroPack Description: Type A qualified, steel, open head drum that has had a nominal $\frac{1}{2}$ " thick layer of polyethylene bonded to the inside of the drum with a integrally, molded flange at the top. Once the waste is loaded into the container, a 1" thick polyethylene Macro lid is placed on the container. The Macro lid has built-in resistance wires that allow the wires to heat up and melt the lid onto the container flange during a Macro-Sealing process. The conventional steel lid is affixed once the Macro process is completed as a secondary closure.

Tests Performed: To show a preliminary proof-of-concept on limited funding, UltraTech performed its own 30' drop tests. Two tests were performed. The drums were filled with sand and fluorescine to 400 lbs.

Test 1: Two 55-gallon drums were loaded to a weight of 400 lbs. each and stacked vertically on top of each other as they would be stacked in a TRUPACT II with a slip sheet of $\frac{3}{8}$ " plywood between the drums. The drums were stretch-wrapped together to hold their positions during the drop. The lower drum was the Ultra-MacroPack as described above and the upper drum was a standard Type A rated 55-gallon steel drum. The upper drum had 350 lbs of sand inside and the Ultra-MacroPack had 300 lbs of sand along with approximately 50 additional lbs of polyethylene in the form of a bonded liner.

The test was designed to drop the package in a vertical mode so that there was a flat bottom impact on the Ultra-Macro Drum with the upper drum directly on top of it at impact.

Test 2: Six 55-gallon drums were loaded to a weight of 400 lbs. each and formed into a 7-pack array as used in TRUPACT II shipments. The Ultra-MacroPack was positioned on the outside so that it would be the first drum to be impacted on a side drop test where a full side drop allowed two upper drums to be positioned directly above the Ultra-MacroPack and two other sets of drums sandwiching it on either side. The side test drop allowed the drums to impact in a horizontal position in the 7-pack configuration.

Test Results: Both tests were successful. There was little structural damage to the Ultra-MacroPacks in either test compared to the damage sustained by the other 55-gallon drums. No fluoresceine was evident in a post-drop water spray test. No release of contents was observed.

In Test 1 (vertical drop test), technical difficulties with the "quick release" mechanism caused three drop tests to be performed on the same drum to obtain a flat bottom drop on the steel plate. The first two drops saw the quick release catch temporarily and allowed the package to fall at an angle, miss the plate and impact on a corner drop test onto compacted sand/soil. Since little structural damage was observed, drop tests were continued until we corrected the technical problem and achieved a flat bottom drop onto the steel plate on the third attempt. Therefore the Ultra-MacroPack used in the Test 1 survived three varying drop tests from 30' successfully.

In Test 2 (horizontal drop test), only one drop was performed and no release of contents occurred.

UltraTech offers many Styles and Models of Ultra-MacroPacks including 55-gallon, 110-gallon, an oversized B-25 steel box with a polyethylene bonded liner for overpacking standard waste boxes and 63" diameter x 3' tall MacroPacks. Custom sizes and styles are available upon request.

Please call or e-mail me with any questions or requests.

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Ultra-MacroEncapsulation Summary

12-29-03

I. Introduction

Macroencapsulation is currently available at facilities permitted by the U.S. Environmental Protection Agency for the treatment of radioactively contaminated hazardous waste. The U.S. Department of Energy is evaluating the use of high-density polyethylene containers to provide a simpler means of meeting macroencapsulation requirements. Macroencapsulation is used for the purpose of isolating waste from the disposal environment in order to meet the Land Disposal Restriction treatment standards for debris-like waste. The containers being evaluated have the potential of providing a long-term reduction in the leachability and subsequent mobility of both the hazardous and radioactive contaminants in this waste while at the same allowing treatment by the generator as the waste is being generated.

UltraTech's staff developed the first Macroencapsulation unit back in 1984 and received a patent for it. Since that time they have provided their technology for use in several applications including 52" Ø x 20' long MacroEncapsulation Containment Units made from extruded pipe for use at INEEL. The technology was also used as the sealing mechanism for a High Integrity Container (HIC) design developed in the 1980s. Recently a 63" x 36" H Macro unit was successfully demonstrated at MSE for the DOE's TMFA and over twenty regulators and site managers. Standard Waste Box sized units, as well as 55-gallon to 110-gallon Ultra-MacroPacks are available in a metal exterior with a polyethylene macro unit bonded to the interior of the steel. These units look like steel drums or boxes from the exterior, yet are enhanced with the macroencapsulation technology to provide a viable unit for differing applications.

II. Treatment Standards for Debris

The U.S. Environmental Protection Agency (EPA) began developing treatment standards for hazardous wastes in the late 1980's. EPA developed these treatment standards based on the Best Demonstrated Available Technology for broad categories of waste. By 1992, EPA realized that wastes such as debris were not amenable to the treatment standards established for process wastes. At that time EPA promulgated alternative treatment standards for debris. They provided several options, one of which was macroencapsulation. EPA had previously established macroencapsulation as the treatment standard for radioactively contaminated lead

solids. EPA defined macroencapsulation as the "application of surface coating materials such as polymeric organics (e.g., resins and plastics) or use of jacket of inert inorganic materials to substantially reduce surface exposure to potential leaching media."

EPA went on to describe a performance standard for macroencapsulation of debris. This performance standard requires that the "encapsulating material must completely encapsulate debris and be resistant to degradation by the debris and its contaminants and materials into which it may come into contact after placement (leachate, other waste, microbes).

III Macroencapsulation Procedure

1. Waste is loaded into the macroencapsulation container.
2. Void space is filled with inert material to help address structural integrity issue.
3. The lid is placed onto the containment unit. The lid contains embedded wires that are now in contact with both the lid and the flanged area at the top of the unit.
4. A compression weight is placed onto the lid.
5. The macroencapsulation control unit is plugged into a 120 V power source and attached to the connector on the lid.
6. An operator pushes a button to start the process. The control unit allows a specific current to flow through the wires for a specific amount of time based on the wire resistance, length, melt index of the polyethylene, etc. The wires heat up and begin to melt the localized area of polyethylene on the lid and containment unit welding them together. Once the process time is completed, the Control Unit shuts down and a green indicator light notifies the operator the process has been successfully completed.
7. Disconnect the power cord from the lid, remove the compression weights and allow the unit to cool before moving. A quick spin weld of a two-inch polyethylene plug seals off the connection area from corrosion concerns.

The process is designed to eliminate variables. The time, current, ohms, wire spacing, compression weight, etc. are all fixed to assure repeatability and successful sealing every time. To the extent possible, human error has been removed as a variable.

IV Temporary Shipping Closure Description

To offer maximum flexibility for users of the Ultra-MacroEncapsulation Containment Units, UltraTech can provide a containment unit with an additional sealing option that would be temporary for on-site handling or for a strong, tight seal during shipments to a disposal facility where inspection may be required prior to macroencapsulating at that facility. This allows the waste to be safely contained upon placing the lid on the package, giving options to the time, date and place the macroencapsulation process is to take place.

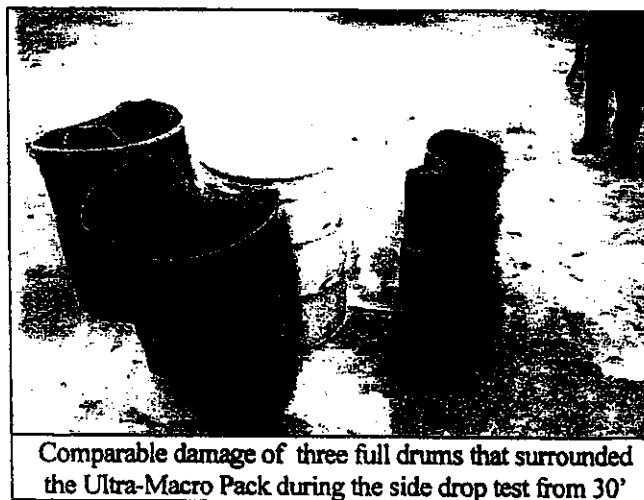
For the all-polyethylene style units, such as the 63" diameter container, a simple steel band sealing option is offered to obtain a temporary seal for shipping. Once the waste is placed inside a 63" diameter container, a gasket is placed on the top of the unit and the lid placed on. Steel banding is then placed around the unit in 6 locations to temporarily secure the lid and compress the gasket. A steel ring is placed on top of the lid to allow even sealing under the

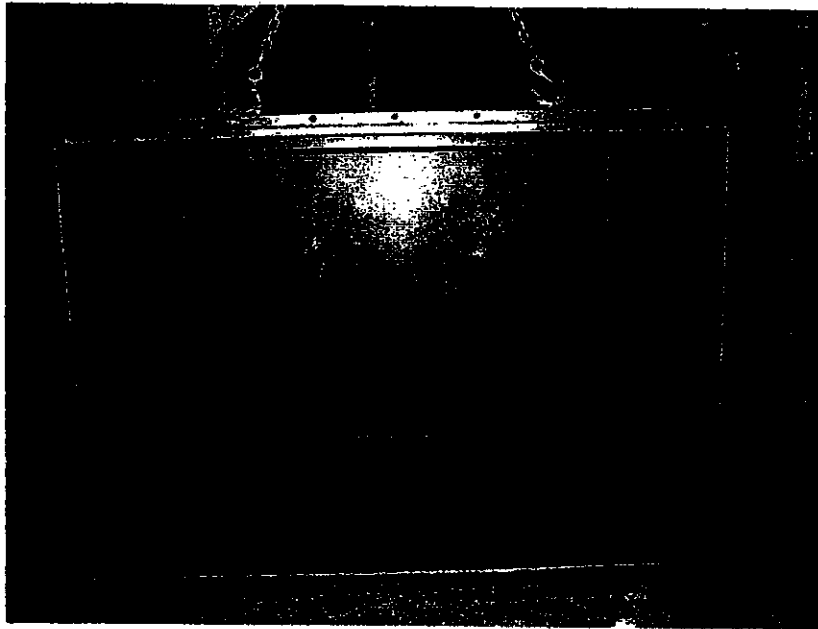
compression of the steel strapping. The unit would ship on a custom designed wood or steel pallet.

For the Ultra-MacroPacks that utilize a steel box or drum as the outer portion of the unit, these units can be sealed and shipped under their Type A shipping approvals as the Macro portion of the units are to the interior.

V Potential Macroencapsulation Container Configurations

One of the primary benefits of using polyethylene containers is the flexibility in container design and capacity. Containers can be manufactured in almost any shape or size imaginable. In addition, polyethylene liners can be molded to the inside of a DOT Type A, pre-approved steel drum or box, offering additional performance, handling features, and fire protection. Currently the inventory of container sizes under evaluation includes 60 ft³ tubes, 100 ft³ boxes, 55-gallon and 110-gallon overpack drums. The 60 ft³ tubes will hold either loose debris or four 55-gallon drums. The 100 ft³ boxes were designed to hold 6 drums, loose debris, or a standard B-25 metal box. The 110-gallon drums can hold a 55-gallon drum, loose debris, or compacted drums. Newly generated waste can be added as loose debris to the macroencapsulation container as it is generated. In addition these containers have the flexibility to manage drummed waste or even a full B-25 box allowing legacy waste that may have been in storage for years to be treated without repackaging all of the waste. The 55-gallon, 110-gallon drums and the 100 ft³ boxes were developed by molding a polyethylene liner to the inside of existing standard issue containers. By using pre-approved containers that have been shown to meet existing DOT specifications, these containers will require only minimal testing prior to use. Relying on this outer metal container reduces the testing requirements to proving that the waste has been successfully isolated from the environment. It is anticipated that the other configurations will be tested in the near future. Recent preliminary testing of the 55-gallon models indicated the units are capable of passing a 30' drop test with a weight of 400 lbs.

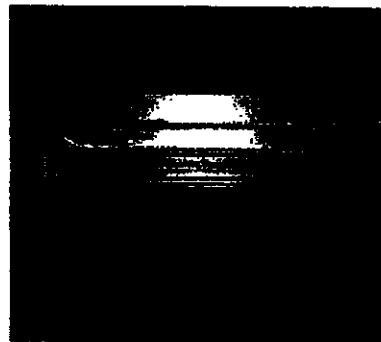




Top view of Oversized Macro Standard Waste Box



Cut-Out of Macro Seal from Box



Seal Area of Macro Box

VI Establishing the Test Plan

The DOE sponsored TRU & Mixed Waste Focus Area was instrumental in developing a test plan to identify the criteria that would be used to determine the acceptability of these 63" Ø containers. The working group, made up of state and federal regulators, interested parties from various DOE sites and industry representatives, identified appropriate criteria from the

EPA guidance, LDR treatment standards, the Department of Transportation (DOT) regulations, disposal facility waste acceptance criteria, existing permits for macroencapsulation, as well as the operating experience of disposal facilities. The regulatory criteria shown in Table I. The disposal facility criteria are shown in Table II. This produced quite an extensive set of requirements that might or might be applicable to any one situation. One of the working group's first challenges was to isolate the minimum set of requirements necessary to utilize these containers on a broad set of waste. Based on limited funding, it was decided that meeting the criteria for higher radiation levels or other unique situations would not be appropriate. Once the containers were proven acceptable and being used, then further funding could be sought to meet other specifications.

The testing criteria broke down into two major areas. First, the test plan sought to prove that containers in general met the criteria for use as both macroencapsulation and for DOT shipping containers. Secondly, the test plan sought to prove that the UltraTech sealing mechanism provided an acceptable seal.

A. Testing Results Summary

Based on the current seal design, testing of the 63" diameter Macro units was completed in January of 2003. This round of testing with the improved design and equipment indicated a consistent seal capable of holding up to 5 psi for an extended period of time. During the demonstration of this equipment for the work group, it was concluded that this provided a high level of confidence regarding the performance and consistency of the seal. Other testing showed the macroencapsulation container passed the Nitrogen Internal Pressure Test, Stack Test and the Handling and Transportation test.



Sixty-three-inch HDPE macroencapsulation containers.

Table I. Regulatory Testing Requirements for Macroencapsulation Containers

Testing Requirement	Demonstration Methodology
<p>RCRA 40 CFR 268.45(a)(1) Table 1</p> <p>The container must substantially reduce the surface exposure of the waste to potential leaching media by completely encapsulating the debris and by being resistant to degradation</p>	<p>The top and bottom of the container are welded to the tube, creating a fully encapsulated waste form. Integrity of the seals is tested using low-pressure (3 psig) nitrogen. Ability of seal to withstand typical container handling during loading, transport and disposal operations also tested by pressure testing loaded container following a simulation of these operations. Finally, metal electrode used to transfer power to the wiring is isolated from the environment by through the placement of a HDPE patch that is applied at the time the waste is treated, using spin weld technology. HDPE packaging and liners are commonly used for transporting, storing and/or disposing of radioactive, mixed and hazardous wastes, primarily based on its recognized resistance to chemicals, corrosive leachates and radiation. Significant data exist on HDPE resistance to chemicals, all of which demonstrate high levels of resistance to almost all forms of chemicals [Bibby-Sterilin, 2002]. Biodegradation has been found to be virtually nonexistent, and significant data are also available demonstrating that HDPE piping is resistant to gamma irradiation levels up to 39 Mrad [Farnsworth, 1994].</p>
<p>The container is structurally sound. [Letter from Richard Kinch, EPA OSW Waste Treatment Branch, to Kevin Igli, Chemical Waste Management, Inc. (September 19, 1995)]</p>	<p>The DOT Stacking Test requirement of 5 times the weight of a loaded package was applied as a best management practice, and modeling was used to demonstrate the container met the requirement. Less or more stringent requirements may be specified in a disposal facility's Part B permit or interim status document (see below under "Disposal Facility WAC").</p>
<p>DOT 49 CFR 173.410(a-h)</p> <p>The macroencapsulation tubes are designed as IP-1, or "strong tight" containers. The requirements include:</p> <ul style="list-style-type: none"> -Capable of withstanding effects of acceleration or vibration arising from normal handling. -Materials of construction are compatible, and behavior of packaging under irradiation is accounted for. 	<p>Modeling conducted on the container with a standard steel pallet demonstrated the combination passed the requirement. Additional modeling will be required when a final decision is made on the pallet and method of attachment.</p> <p>Significant data available demonstrating no deleterious effects at gamma irradiation levels up to 39 Mrad [Farnsworth, 1994].</p>

Farnsworth 1994 Farnsworth, R. K. *Demonstration and Evaluation of Arrow Construction's ARROW-PAK as an Alternative Macro and Improved Container for Mixed Waste Storage and Disposal*. Prepared by EG&G Idaho for the Department of Energy. April 1994

Table II. Disposal Facility Specific Requirements

B. Testing Requirement	Demonstration Methodology
Hanford WAC Section 3.3.6 Package is constructed of fire-retardant materials having a maximum flame-spread index of 25 when tested under ASTM E-84-96	The macroencapsulation tubes do not meet this requirement as currently designed, due to the presence of a HDPE exterior. The macroencapsulation boxes and overpacks will meet this requirement because they have a steel exterior.
Envirocare Part B permit, Attachment II-1-9, Section 2.i. The closure mechanism must be capable of withstanding the effects of normal conditions of storage and transport without any deterioration in the effectiveness of the closure mechanism.	Vibration/acceleration modeling, in combination with putting the container through the test plan handling protocol, demonstrates the container meets this criterion.
Part B permit, Attachment II-1-9, Section 3.c.iv. The encapsulating material shall have long-term integrity such that potential leaching media within a hazardous waste cell would not cause the encapsulating material to deteriorate.	See response to general RCRA requirement under "RCRA" above.
Structural integrity. The Macro Containers shall be rated by the manufacturer as to the maximum weight capacity.	Will be calculated via modeling at MSE or provided by UltraTech.

C. Testing Details

The overall objective of this work was to evaluate whether the macroencapsulation units developed by UltraTech met requirements outlined by the working group for seal and container integrity during normal handling, storage, and disposal of the macroencapsulated waste.

Accordingly, under the direction of the DOE Transuranic and Mixed Waste Focus Area (TMFA), MSE-TA tested and evaluated 63-in.-diameter HDPE macroencapsulation units developed by UltraTech. In all, six 1-ft-high units were evaluated to determine seal integrity, and six 3-ft-high units were evaluated to determine the impact that normal handling of the

units had on unit and seal integrity. Structural testing and modeling was also performed to determine if the units met the criteria established by the DOE.

Specific objectives of the macroencapsulation unit testing and evaluation were:

- set up a macroencapsulation unit testing laboratory to provide on-site testing and evaluation
- determine the seal integrity of both the temporary mechanical and permanent thermal seal macroencapsulation units; and
- determine the integrity of the sealed macroencapsulation units and seals when subjected to normal handling and storage conditions.

D. Modeling

The integrity of the macroencapsulation units were modeled using software and loads equal to the stack test criteria specified in the test plan, and the containers were modeled to demonstrate compliance with vibration criteria established in 49 *Code of Federal Regulations* (CFR) 178.608.

The model testing included structural integrity modeling using RISA-3D software. Models and structural analyses were completed for exterior loads for the macroencapsulation containers. Load direction was a uniform axial compression loading on the lid. The magnitude of both the uniform axial compression load was five times and nine times the estimated gross weight of a single macroencapsulation unit, respectively. On an overview basis, the RISA-3D model indicated that for these loading conditions, the member forces, member stresses, and member deflections were not being exceeded. In fact, the member forces and stresses were very low for the loading conditions.

Vibration integrity modeling was completed using ANSYS Structural Analysis software. This software determined deformations, strains, stresses, and reaction forces based on loading criteria in accordance with 49 CFR 178.608. The peak dynamic stresses (1,700 psi) were well within the minimum allowable stress of 2,600 psi. The packing material assumed has a very low cohesive strength of 0.2 psi; consequently, the container stresses are not likely to change much with different packing.

E. Seal Testing

The macroencapsulation units that were evaluated were subjected to a nitrogen pressure test, a handling/transport test, and a stack test. These tests are shown in Table III. Sealed units, as indicated in the test matrix, were carefully cut at the pipe/lid sealed joint interface location. This sectioning exposed the cross-sectional area of the fused HDPE joint of the container unit for visual examination of the fusion that occurs during the UltraTech macroencapsulation welding process. Visual examination consisted of inspecting the base materials adjacent to the welded joint, as well as the filler material of the welded joint itself. The visual examination intended to look for inadequate fusion, consistency of fusion, amounts of voids, density difference between base material and fused material, and possible development of any type of crystalline areas.

The inside of each unit was pressurized 3 to 5 psig and isolated from the nitrogen pressurizing source. The pressure was monitored for 1 hr using a calibrated gauge to verify this pressure

and any changes in the pressure within the unit. If a loss in pressure was observed, a solution of soap and water was applied to the outside of the seal, and this joint was visually inspected for signs of bubbles to identify the location of the leak(s). Once the soap bubble test was complete, a calibrated oxygen monitor with a sensing probe was applied to also identify the location of any leak(s).

This test was generally performed to 49 CFR 173.465 (d) and the project criteria of five and nine times the gross weight of a 3-ft-high macroencapsulation container. The estimated gross weight of a 3-ft container is 6,615 lb, which means that the containers subject to this test will have a uniformly loaded lid to approximately 33,076 lb and approximately 59,537 lb. Loading was applied to the filled 3-ft-long macroencapsulation containers by a structural steel loading frame, hydraulic pressure, and load distribution platform with a maximum loading capability of 80,000 lb. Load cells or similar devices were incorporated into the load frame for measuring axial compressive loads placed on the macroencapsulation container. In addition to the post visual examination and container measurements prescribed by this standard, MSE repeated a soap bubble/nitrogen pressure test after completion of this test to determine the effect that the loading had on seal integrity.

No visual signs of surface cracking, deformations, or misalignments were noted. The average axial compressive deflection of the container when loaded to 33,075 lb. ended up being approximately 1/16 in. The average axial compressive deflection of the container when loaded to 59,535 lbs. was approximately 3/32 in. Both these deflections are more well within the material properties elastic limits, which mean these imposed loads should have no negative structural impact on the containers.

Using a forklift, overhead crane, and heavy-duty truck, MSE handled and transported two 3-ft-tall macroencapsulation containers to determine how well the seal stands up to normal handling practices. Specifically, the container was manipulated with the forklift and overhead crane, loaded on a truck, transported as part of the handling protocol, and then unloaded from the truck. The 3-ft macroencapsulation containers were filled with appropriately weighted solid materials to simulate the gross weight. At that point, the container was closed and sealed mechanically and put through the handling/transportation test. The purpose of this test was to confirm that shipment of a loaded container using only mechanical sealing does not cause damage to the thermal sealing surface. With completion of the handling/transportation test, the container was thermally sealed and tested for integrity using the nitrogen pressure test. For the second test, a 3-ft container was similarly loaded with simulated waste, thermally sealed, and put through the handling/transportation test. At completion of the handling protocol, in addition to the post visual examination and container measurements prescribed by this standard, MSE completed a nitrogen pressure test to determine the effect that the handling/transportation test had on seal integrity.

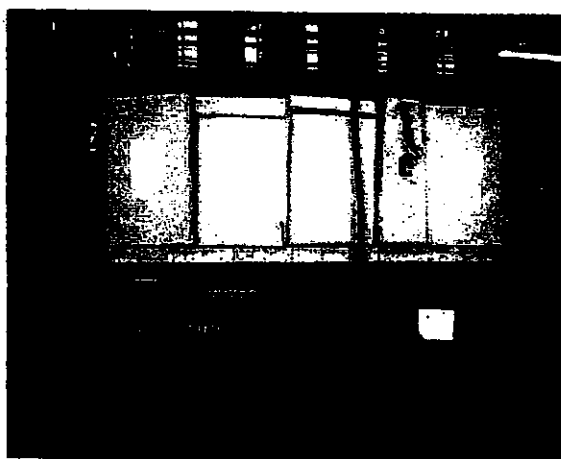
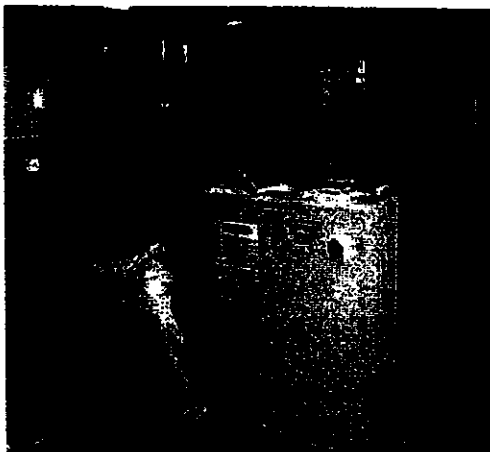
Table III - Tests for 63-in. Diameter Macroencapsulation Test Units performed by MSE

Test Name	Item Tested	Test Objective	Length of Test	Test Frequency	Test Standard	Comments
Nitrogen Pressure (Internal)	Seal	Determine if nitrogen passes through seal	1 hr	Three around total perimeter of seal	Normal industrial procedure	Pressurize to 3 psig with nitrogen and monitor pressure for 1 hr. If drop in pressure, use bubble test and/or oxygen meter to identify location of leak and to gauge extent of leak.
Stack Test	Unit and seal	Determine deformities and leak rate after stack test	24 hr	One each	Load tested to 49 CFR 173.465 (d) and five times gross weight (5xGW) and nine times gross weight (9xGW)	Complete visual examination for deformities and complete soap bubble/nitrogen test
Handling/Transport Test	Unit and seal	Determine deformities and leak rate after test	16 hr	One each	As described in Section 4.2 of the test plan	Complete visual examination for deformities, documentation handling/ transportation issues, and complete soap bubble/nitrogen test

NOTE: The 63" units tested by MSE were made of HDPE pipe. The data is provided to show the effectiveness of the macro seal and the unit for purposes of RFETS's review of this proposal. The unit being proposed is designed to the specific application at RFETS and has some differing design features.

VI Requirements for Macroencapsulation

The requirements are minimal. One operator, one Ultra-MacroEncapsulation Control Unit, a source of 120 V, 50 amp power and a working area large enough to accommodate the specific size of the containment unit is all that is required. The Control Unit can be mounted on a wheeled dolly to make it easy to move to each unit to be sealed.



EVALUATION OF HDPE CONTAINERS FOR MACROENCAPSULATION OF MIXED WASTE DEBRIS

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ABSTRACT

Macroencapsulation is currently available at facilities permitted by the U.S. Environmental Protection Agency for the treatment of radioactively contaminated hazardous waste. The U.S. Department of Energy is evaluating the use of high-density polyethylene containers to provide a simpler means of meeting macroencapsulation requirements. Macroencapsulation is used for the purpose of isolating waste from the disposal environment in order to meet the Land Disposal Restriction treatment standards for debris-like waste. The containers being evaluated have the potential of providing a long-term reduction in the leachability and subsequent mobility of both the hazardous and radioactive contaminants in this waste while at the same allowing treatment by the generator as the waste is being generated. While the testing discussed in this paper shows that further developmental work is necessary, these tests also indicate that these containers have the potential to reduce the cost, schedule, and complexity of meeting the treatment standard for mixed waste debris.

INTRODUCTION

Macroencapsulation as specified by the U.S. Environmental Protection Agency (EPA) is designed to isolate hazardous waste from the disposal environment. The macroencapsulation process uses inert or non-reactive materials to achieve this isolation. The purpose of this research was to simplify and standardize the macroencapsulation process in order to promote the appropriate use of this technology.

Treatment Standards for Debris

The U.S. Environmental Protection Agency (EPA) began developing treatment standards for hazardous wastes in the late 1980's. EPA developed these treatment standards based on the Best Demonstrated Available Technology for broad categories of waste. By 1992, EPA realized that wastes such as debris were not amenable to the treatment standards established for process wastes. At that time EPA promulgated alternative treatment standards for debris. They provided several options, one of which was macroencapsulation. EPA had previously established macroencapsulation as the treatment standard for radioactively contaminated lead solids. EPA defined macroencapsulation as the "application of surface coating materials such as polymeric

organics (e.g., resins and plastics) or use of jacket of inert inorganic materials to substantially reduce surface exposure to potential leaching media."

EPA went on to describe a performance standard for macroencapsulation of debris. This performance standard requires that the "encapsulating material must completely encapsulate debris and be resistant to degradation by the debris and its contaminants and materials into which it may come into contact after placement (leachate, other waste, microbes).

Currently Available Macroencapsulation Technologies

There are three primary methods of macroencapsulation commercially available as this paper is being written. The first of these technologies developed at Brookhaven National Laboratory is polymer extrusion. Essentially the waste is placed in a mold and molten polyethylene is extruded around the waste. This technology is principally available at the Envirocare facility in Utah. The second technology is the Arrowpack. Waste is compacted in drums and placed in the large high-density polyethylene (HDPE) pipes approximately 20 ft. long. When the container is full, an endcap is sealed to the unit using standard pipeline technology. This technology has been demonstrated at Hanford and Oak Ridge. The third technology employs the use of stainless steel boxes and grout. Waste is placed in the box and a flowable grout is then added to the container. More specialized examples of macroencapsulation can also be found at DOE sites where stainless steel or polystyrene have been used to macroencapsulate specific wastes.

Motivation for Pursuing Alternative Treatment Technology

All of these technologies work for the macroencapsulation of waste. The purpose of the work described in this paper is to determine whether or not standard HDPE containers can be made that can be used by the waste generator without the requirement for expensive equipment or permitting. This paper describes the efforts to demonstrate the simplicity, reproducibility, and robustness of the sealing technology developed by the UltraTech International, Inc. Testing was done at the Western Environmental Technology Office by MSE Technology Applications, Inc (MSE-TA), in Butte, MT under contract #DE-AC22-96EW96405 to the Department of Energy to determine the efficacy of using this technology. A further motivation for pursuing an alternate technology is that, the Department of Energy (DOE) generates waste that cannot be shipped to commercial treatment facilities. This may be due to high radiation fields, classified nature, or that disposal facilities are not currently available.

Technology Selection

The DOE sponsored TRU & Mixed Waste Focus Area reviewed several potential macroencapsulation technologies that might provide an alternative to the existing macroencapsulation technologies. These included spin welding, concrete, polystyrene, and polyethylene. In the end polyethylene was chosen for a number of reasons. Polyethylene containers are routinely used for packaging and shipment of wastes. Polyethylene is easily worked and can be formed in numerous configurations. The excellent chemical resistance of polyethylene is common knowledge. Initial evaluations also indicated that a simple method of welding the lid to polyethylene containers was available. This mechanism for sealing hazardous waste containers was developed by Mark Shaw of UltraTech and was granted patent 4,586,624 on May 6, 1986. UltraTech was contacted and agreed to participate in the demonstration to prove the usability of these containers in the mixed waste debris treatment process. The UltraTech process relies on resistance wires that are embedded in the lid of a polyethylene

macroencapsulation unit to create the sealing phenomenon. While the UltraTech process was used in this demonstration, there is no reason to believe that other sealing processes might not also be sufficient.

Potential Macroencapsulation Container Configurations

One of the primary benefits of using polyethylene containers is the flexibility in container design and capacity. Containers can be manufactured in almost any shape or size imaginable. In addition, polyethylene liners can be molded to the inside of a DOT pre-approved steel drum or box, offering additional performance, handling features, and fire protection. Currently the inventory of container sizes under evaluation includes 60 ft³ tubes, 100 ft³ boxes, and 110-gallon overpack drums. The 60 ft³ tubes will hold either loose debris or four 55-gallon drums. The 100 ft³ boxes were designed to hold 6 drums, loose debris, or a standard B-25 metal box. The 110 gallon drum can hold a 55 gallon drum, loose debris, or compacted drums. Newly generated waste can be added as loose debris to the macroencapsulation container as it is generated. In addition these containers have the flexibility to manage drummed waste or even a full B-25 box allowing legacy waste that may have been in storage for years to be treated without repackaging all of the waste. Again because funding has been limited, the testing to date has been limited to the 60 ft³ tubs. The 110 gallon drums and the 100 ft³ boxes were both developed by molding a polyethylene liner to the inside of existing standard issue containers. By using pre-approved containers that have been shown to meet existing DOT specifications, these containers will require only minimal testing prior to use. Relying on this outer metal container reduces the testing requirements proving that the waste has been successfully isolated from the environment. It is anticipated that the other configurations will be tested in the near future.

Macroencapsulation Working Group

The EPA, DOE, and several state regulatory agencies formed a working group to oversee the testing of these containers. The purpose of this oversight group was to ensure that the testing would not only meet the regulatory needs of the agencies, but would also meet the waste acceptance criteria at the disposal facilities. EPA and several key states were invited to participate to ensure that the final product would meet the regulatory requirements. In addition, treatment and disposal facilities were encouraged to participate to facilitate the eventual acceptance of these containers into their units for disposal. Bi-weekly conference calls were held to monitor the progress of the testing.

Macroencapsulation Procedure

1. Waste is loaded into the macroencapsulation container.
2. Void space is filled with inert material to help address structural integrity issue.
3. The lid is placed onto the containment unit. The lid contains embedded wires that are now in contact with both the lid and the flanged area at the top of the unit.
4. A compression weight is placed onto the lid.
5. The macroencapsulation control unit is plugged into a 120 V power source and attached to the connector on the lid.
6. An operator pushes a button to start the process. The control unit allows a specific current to flow through the wires for a specific amount of time based on the wire resistance, length, melt index of the polyethylene, etc. The wires heat up and begin to melt the localized area of polyethylene on the lid and containment unit welding them

together. Once the process time is completed, the Control Unit shuts down and a green indicator light notifies the operator the process has been successfully completed.

7. Disconnect the power cord from the lid, remove the compression weights and allow the unit to cool before moving. A quick spin weld of a two inch polyethylene plug seals off the connection area from corrosion concerns.

Establishing the Test Plan

The first step in developing a test plan was to identify the criteria that would be used to determine the acceptability of these containers. The working group identified appropriate criteria from the EPA guidance, LDR treatment standards, the Department of Transportation (DOT) regulations, disposal facility waste acceptance criteria, existing permits for macroencapsulation, as well as the operating experience of disposal facilities. The regulatory criteria are shown in Table I. The disposal facility criteria are shown in Table II. This produced quite an extensive set of requirements that might be applicable to any one situation. One of the working group's first challenges was to isolate the minimum set of requirements necessary to utilize these containers on a broad set of waste. Based on limited funding, it was decided that meeting the criteria for higher radiation levels or other unique situations would not be appropriate. Once the containers were proven acceptable and being used, then further funding could be sought to meet other specifications.

The testing criteria broke down into two major areas. First, the test plan sought to prove that containers in general met the criteria for use as both macroencapsulation and for DOT shipping containers. Secondly, the test plan sought to prove that the UltraTech sealing mechanism provided an acceptable seal.

Testing Results Summary

Testing of the containers began late in 2002. Testing initially revealed issues with obtaining a consistent seal. The EPA standard simply requires that macroencapsulation processes must substantially reduce the surface exposure of the waste to potential leaching media. This standard was clearly being met, but the working group agreed that it was important to eliminate any variables in the sealing process.

As testing proceeded there was an effort to standardize the sealing method. Most sealing to this point had been conducted by the technology developer. The working group thought it was important to ensure that acceptable seals could be obtained by anyone capable of following a simple procedure. To ensure this simplicity, the controller, the sealing surfaces, and clamping system were refined to ensure a consistent process that would produce consistent seals. Working together, the group was able to develop a state of the art welding unit that enhanced the ability to closely control current and voltage, thereby increasing the quality and reliability of the welds.

Testing of the 63 inch diameter tubes was completed in January of 2003. The latest round of testing with the improved design and equipment indicated a consistent seal capable of holding up to 3 psi for an extended period of time. During the demonstration of this equipment for the workgroup, it was concluded that this provided a high level of confidence regarding the performance and consistency of the seal. Other testing showed the macroencapsulation container passed the Nitrogen Internal Pressure Test, Stack Test and the Handling and Transportation test.

Table I. Regulatory Testing Requirements for Macroencapsulation Containers

Testing Requirement	Demonstration Methodology
<p>RCRA 40 CFR 268.45(a)(1) Table 1</p> <p>The container must substantially reduce the surface exposure of the waste to potential leaching media by completely encapsulating the debris and by being resistant to degradation</p>	<p>The top and bottom of the container are welded to the tube, creating a fully encapsulated waste form. Integrity of the seals is tested using low-pressure (3 psig) nitrogen. Ability of seal to withstand typical container handling during loading, transport and disposal operations also tested by pressure testing loaded container following a simulation of these operations. Finally, metal electrode used to transfer power to the wiring is isolated from the environment by through the placement of a HDPE patch that is applied at the time the waste is treated, using spin weld technology. HDPE packaging and liners are commonly used for transporting, storing and/or disposing of radioactive, mixed and hazardous wastes, primarily based on its recognized resistance to chemicals, corrosive leachates and radiation. Significant data exist on HDPE resistance to chemicals, all of which demonstrate high levels of resistance to almost all forms of chemicals [Bibby-Sterilin, 2002]. Biodegradation has been found to be virtually nonexistent, and significant data are also available demonstrating that HDPE piping is resistant to gamma irradiation levels up to 39 Mrad [Farnsworth, 1994].</p>
<p>The container is structurally sound. [Letter from Richard Kinch, EPA OSW Waste Treatment Branch, to Kevin Igli, Chemical Waste Management, Inc. (September 19, 1995)]</p>	<p>The DOT Stacking Test requirement of 5 times the weight of a loaded package was applied as a best management practice, and modeling was used to demonstrate the container met the requirement. Less or more stringent requirements may be specified in a disposal facility's Part B permit or interim status document (see below under "Disposal Facility WAC").</p>
<p>DOT 49 CFR 173.410(a-h)</p> <p>The macroencapsulation tubes are designed as IP-1, or "strong tight" containers. The requirements include:</p> <ul style="list-style-type: none"> -Capable of withstanding effects of acceleration or vibration arising from normal handling. -Materials of construction are compatible, and behavior of packaging under irradiation is accounted for. 	<p>Modeling conducted on the container with a standard steel pallet demonstrated the combination passed the requirement. Additional modeling will be required when a final decision is made on the pallet and method of attachment.</p> <p>Significant data available demonstrating no deleterious effects at gamma irradiation levels up to 39 Mrad [Farnsworth, 1994].</p>

Farnsworth 1994 Farnsworth, R. K. *Demonstration and Evaluation of Arrow Construction's ARROW-PAK as an Alternative Macro and Improved Container for Mixed Waste Storage and Disposal*. Prepared by EG&G Idaho for the Department of Energy. April 1994

Table II. Disposal Facility Specific Requirements

Testing Requirement	Demonstration Methodology
<p>Hanford WAC Section 3.3.6 Package is constructed of fire-retardant materials having a maximum flame-spread index of 25 when tested under ASTM E-84-96</p>	<p>The macroencapsulation tubes do not meet this requirement as currently designed, due to the presence of a HDPE exterior. The macroencapsulation boxes and overpacks will meet this requirement because they have a steel exterior.</p>
<p>Envirocare Part B permit, Attachment II-1-9, Section 2.i. The closure mechanism must be capable of withstanding the effects of normal conditions of storage and transport without any deterioration in the effectiveness of the closure mechanism.</p>	<p>Vibration/acceleration modeling, in combination with putting the container through the test plan handling protocol, demonstrates the container meets this criterion.</p>
<p>Part B permit, Attachment II-1-9, Section 3.c.iv. The encapsulating material shall have long-term integrity such that potential leaching media within a hazardous waste cell would not cause the encapsulating material to deteriorate.</p>	<p>See response to general RCRA requirement under "RCRA" above.</p>
<p>Structural integrity. The Macro Containers shall be rated by the manufacturer as to the maximum weight capacity.</p>	<p>Will be calculated via modeling at MSE.</p>

Testing Details

The overall objective of this work was to evaluate whether the macroencapsulation units developed by UltraTech met requirements outlined by the working group for seal and container integrity during normal handling, storage, and disposal of the macroencapsulated waste.

Accordingly, under the direction of the DOE Transuranic and Mixed Waste Focus Area (TMFA), MSE-TA tested and evaluated 63-in.-diameter HDPE macroencapsulation units developed by UltraTech. In all, six 1-ft-high units were evaluated to determine seal integrity, and six 3-ft-high units were evaluated to determine the impact that normal handling of the units had on unit and seal integrity. Structural testing and modeling was also performed to determine if the units met the criteria established by the DOE.

Specific objectives of the macroencapsulation unit testing and evaluation were:

- set up a macroencapsulation unit testing laboratory to provide on-site testing and evaluation
- determine the seal integrity of both the temporary mechanical and permanent thermal seal macroencapsulation units; and
- determine the integrity of the sealed macroencapsulation units and seals when subjected to normal handling and storage conditions.

Modeling

The integrity of the macroencapsulation units were modeled using software and loads equal to the stack test criteria specified in the test plan, and the containers were modeled to demonstrate compliance with vibration criteria established in 49 *Code of Federal Regulations* (CFR) 178.608. The model testing included structural integrity modeling using RISA-3D software. Models and structural analyses were completed for exterior loads for the macroencapsulation containers. Load direction was a uniform axial compression loading on the lid. The magnitude of both the uniform axial compression load was five times and nine times the estimated gross weight of a single macroencapsulation unit, respectively. On an overview basis, the RISA-3D model indicated that for these loading conditions, the member forces, member stresses, and member deflections were not being exceeded. In fact, the member forces and stresses were very low for the loading conditions.

Vibration integrity modeling was completed using ANSYS Structural Analysis software. This software determined deformations, strains, stresses, and reaction forces based on loading criteria in accordance with 49 CFR 178.608. The peak dynamic stresses (1,700 psi) were well within the minimum allowable stress of 2,600 psi. The packing material assumed has a very low cohesive strength of 0.2 psi; consequently, the container stresses are not likely to change much with different packing.

Seal Testing

The macroencapsulation units that were evaluated were subjected to a nitrogen pressure test, a handling/transport test, and a stack test. These tests are shown in Table III. Sealed units, as indicated in the test matrix, were carefully cut at the pipe/lid sealed joint interface location. This sectioning exposed the cross-sectional area of the fused HDPE joint of the container unit for visual examination of the fusion that occurs during the UltraTech macroencapsulation welding process. Visual examination consisted of inspecting the base materials adjacent to the welded joint, as well as the filler material of the welded joint itself. The visual examination intended to look for inadequate fusion, consistency of fusion, amounts of voids, density difference between base material and fused material, and possible development of any type of crystalline areas.

The inside of each unit was pressurized 3 to 5 psig and isolated from the nitrogen pressurizing source. The pressure was monitored for 1 hr using a calibrated gauge to verify this pressure and any changes in the pressure within the unit. If a loss in pressure was observed, a solution of soap and water was applied to the outside of the seal, and this joint was visually inspected for signs of bubbles to identify the location of the leak(s). Once the soap bubble test was complete, a calibrated oxygen monitor with a sensing probe was applied to also identify the location of any leak(s).

This test was generally performed to 49 CFR 173.465 (d) and the project criteria of five and nine times the gross weight of a 3-ft-high macroencapsulation container. The estimated gross weight of a 3-ft container is 6,615 lb, which means that the containers subject to this test will have a uniformly loaded lid to approximately 33,076 lb and approximately 59,537 lb. Loading was applied to the filled 3-ft-high macroencapsulation containers by a structural steel loading frame, hydraulic pressure, and load distribution platform with a maximum loading capability of 80,000 lb. Load cells or similar devices were incorporated into the loadframe for measuring axial compressive loads placed on the macroencapsulation container. In addition to the postvisual examination and container measurements prescribed by this standard, MSE repeated a soap bubble/nitrogen pressure test after completion of this test to determine the effect that the loading had on seal integrity.

No visual signs of surface cracking, deformations, or misalignments were noted. The average axial compressive deflection of the container when loaded to 33,075 lb. ended up being approximately 1/16 in. The average axial compressive deflection of the container when loaded to 59,535 lb. was approximately 3/32 in. Both these deflections are well within the material properties elastic limits, which mean these imposed loads should have no negative structural impact on the containers.

Using a forklift, overhead crane, and heavy-duty truck, MSE handled and transported two 3-ft-high macroencapsulation containers to determine how well the seal stands up to normal handling practices. Specifically, the container was manipulated with the forklift and overhead crane, loaded on a truck, transported as part of the handling protocol, and then unloaded from the truck. The 3-ft macroencapsulation containers were filled with appropriately weighted solid materials to simulate the gross weight. At that point, the container was closed and sealed mechanically and put through the handling/transportation test. The purpose of this test was to confirm that shipment of a loaded container using only mechanical sealing does not cause damage to the thermal sealing surface. With completion of the handling/transportation test, the container was thermally sealed and tested for integrity using the nitrogen pressure test. For the second test, a 3-ft container was similarly loaded with simulated waste, thermally sealed, and put through the handling/transportation test. At completion of the handling protocol, in addition to the postvisual examination and container measurements prescribed by this standard, MSE completed a nitrogen pressure test to determine the effect that the handling/transportation test had on seal integrity.

Fire Safety

One disposal facility was concerned over the potential combustibility of these containers in their disposal facility. Unlike most disposal facilities that bury their waste soon after it arrives, this particular facility leaves the disposed waste open for up to a year. There was concern that if a fast moving prairie fire swept through the area that the polyethylene containers would provide additional material for combustion. Several methods were discussed to address this situation. The facility could limit the use of these containers to those with metal exteriors or require the application of a flame retardant material. The facility also provide the opportunity to seek an exemption to allow specific management approaches that would allow these containers to be covered in the disposal pit on a more timely basis.

Table III. HDPE Tests for 63-in. Diameter Macroencapsulation Test Units.

Test Name	Item Tested	Test Objective	Length of Test	Test Frequency	Test Standard	Comments
Nitrogen Pressure (Internal)	Seal	Determine if nitrogen passes through seal	1 hr	Three around total perimeter of seal	Normal industrial procedure	Pressurize to 3 psig with nitrogen and monitor pressure for 1 hr. If drop in pressure, use bubble test and/or oxygen meter to identify location of leak and to gauge extent of leak.
Stack Test	Unit and seal	Determine deformities and leak rate after stack test	24 hr	One each	Load tested to 49 CFR 173.465 (d) and five times gross weight (5xGW) and nine times gross weight (9xGW)	Complete visual examination for deformities and complete soap bubble/nitrogen test
Handling/Transport Test	Unit and seal	Determine deformities and leak rate after test	16 hr	One each	As described in Section 4.2 of the test plan	Complete visual examination for deformities, documentation handling/transportation issues, and complete soap bubble/nitrogen test

Macroencapsulation of Radioactive Lead Solids

The treatment standard for radioactive lead solids is very similar to the macroencapsulation treatment standard for debris. The standard for lead requires macroencapsulation but specifically prohibits the use of tanks for containers. This standard was already in place when EPA established the debris standard. In that standard EPA stated that they wanted to provide more flexibility for debris than was being allowed for lead. DOE is now petitioning EPA to go back and modify the lead standard to match the debris standard. Over the years it has been extremely confusing to have two macroencapsulation standards only varying by whether or not they utilize containers and tanks.

Further Testing

The sealing mechanism has been shown to be effective for macroencapsulation tubes. This testing should lead to a standardized sealing procedure that will allow the use of these containers by reasonably trained waste treatment facility technicians. Further testing of other container configurations should be conducted to obtain the same confidence in other sizes of containers.

Current Status

On January 29, 2003, eighteen members of the working group— from the Idaho National Engineering and Environmental Laboratory (INEEL), the State of Utah, the U.S. Environmental Protection Agency, Pantex, the Nevada Test Site, Permafix, the Los Alamos National Laboratory, Duratek, Performance Development Corporation, and UltraTech International, Inc. (UltraTech) were on site to witness the 63-inch diameter high-density polyethylene (HDPE) container (Figure 1) macroencapsulation demonstration. The work was sponsored by the U.S.

Department of Energy (DOE)-Office of Science and Technology, working through Bechtel BWXT Idaho, LLC and the INEEL. The vendor of the technology is UltraTech of Jacksonville, Florida. MSE Technology Applications, Inc. (MSE), working with UltraTech International, Inc, and the INEEL group, designed the test, provided the test setup, executed the test demonstration, and will provide a final report.

The macroencapsulation demonstration was successful and met most of the test objectives.

Macrotubes were found to be structurally sound for stacking five high. A new controller was designed, fabricated, and successfully used. Reduction of power level resulted in dramatically improved welds. Seven of nine attempted welds were successfully completed. Reasons for the two failed welds were documented and lessons learned were incorporated into the latest weld procedure. A spin weld methodology was developed for sealing the terminal entrances.



Figure 1. Sixty-three-inch HDPE macroencapsulation containers.

Conclusions

Testing has shown that these containers meet the requirements of EPA and DOT for use as macroencapsulation containers. The testing and evaluation also indicate the following features and benefits may be available with this specific process as well:

- Ability to temporarily seal the units for storage or shipping and permanently macroencapsulating the unit at a later date or location after inspection or shipment.
- Macro seal designed to hold 3 psi and meet site specific performance criteria.
- Flexibility in design; units can be available in 55 gallon, 85 gallon, 110 gallon drums, 63" diameter and smaller polyethylene pipe of any length, B-25 size and oversized to allow overpacking of existing containers.
- The design allows top or vertical loading to assure maximum loading and minimal void space. Void spaces can be easily filled prior to closing.
- The potential for the polyethylene to be molded directly into steel drums, overpacks, boxes and other containers to offer the additional protection of steel for handling, stacking and fire rating.
- The Macro units can be designed to meet strong, tight container regulations and potentially designed to meet IP-2, Type A packaging standards, even High Integrity Container (HIC) standards.
- Custom sizes and shapes can be made available to meet specific-site needs.

Testing has shown that these containers meet the requirements of EPA and DOT for use as macroencapsulation containers. Outstanding items that may need to be completed include repeatability weld testing for new container configurations, vibration analysis, development of hoisting and rigging procedures for the macrotubes, improvement of the electrical terminals, and designing the connecting pallet. Immediate follow-on work to complete these items is being estimated and will be negotiated. The working group believes that these macroencapsulation containers will be ready for use, when the additional work mentioned above is completed and are working with various DOE sites to establish an opportunity to conduct a demonstration on real waste. Negotiations are currently underway to ship demonstration models to appropriate DOE facilities for their evaluation.

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APPENDIX 8-2
EXAMPLES OF NOCHAR PRODUCTS

TECHNOLOGY ROCKY FLATS

Demonstration & Deployment Summary

Aqueous and Oil/Organic Liquid TRU Waste- Solidification Method Test Summary

The decontamination and decommissioning of Rocky Flats facilities has presented the TRU Waste Program with a unique challenge with respect to the treatment of liquid waste. Liquid waste is no longer being generated as large volume, homogeneous waste streams that can be treated in dedicated treatment facilities. Liquids are now being generated in small quantities, in many locations (some inaccessible) and are highly variable in composition. In addition, the facilities that were once available for treatment of liquids are being torn down! In response, Rocky Flats had to re-think the way it managed TRU waste liquids. A new solidification process that was flexible and mobile was needed. Rocky Flats successfully developed a "point of generation treatment" approach that meets the needs of the Site and the Project.

The Project Need & Goals

Since TRU liquid waste cannot be shipped and disposed at the WIPP, liquid waste must be processed into a WIPP acceptable solidified waste form. Rocky Flats needed a toolbox of technologies and a corresponding technology management approach that would enable us to consistently produce an acceptable waste form from a wide variety of TRU waste liquids and which could be used at the point at which they were encountered. Due to the variability of the TRU waste liquid and the constraints associated with the management of radioactive liquid wastes in D&D facilities, the approach had to be flexible, easy, cost effective, and safe.

The Technology Solution

The TRU Waste Orphan Project was given the challenge to identify, demonstrate, and implement the new technical/operational approach. The Project evaluated several novel treatment technologies and approaches and chose to pursue the use of "super-absorbent" solidification agents as the preferred treatment option. In a funding partnership with DOE's Office of Science and Technology and Technology Solutions Program, a series of super-absorbent polymer agents were tested and NOCHAR Petro Bond and Acid Bond were chosen as the



Nochar Demonstration Of Oil Stabilization After Nochar Was Introduced Into Waste Oil Inside Building 774.

two super-absorbents that best met the Project's objectives. NOCHAR products and products from other vendors had been developed in recent years with EM50 support. Methods were developed to treat the wastes at the locations on the site where the wastes were and packaged for shipment in such a way that the product was certified without having to go through the site's central transportation processing a second time.

The Project

Once the process solution was identified, the Project then proposed a novel approach to implement the process. The Project worked closely with the D&D Projects to develop the "point of generation" process. The new process allowed the D&D Projects to immediately treat and package TRU liquid waste at the point where they were encountered, thus eliminating the need to accumulate, store, and transfer these liquids to a centralized treatment area (which didn't exist). The Project provided the D&D Projects with the process conditions that needed to be maintained. The Projects then incorporated the conditions into their operating procedures.

Waste produced by the Solidification Process will be characterized and certified for shipment and disposal in accordance with WIPP-approved site procedures. Therefore, the intent of process testing was to show that the process would consistently produce a waste that can be certified for shipment to WIPP. Since extensive testing involving solidification of oil and organic waste

TECHNOLOGY ROCKY FLATS

with Nochar Petro Bond has been conducted at other DOE sites, the experiments performed at Rocky Flats focused on testing the effectiveness of Nochar Acid Bond for solidification of various aqueous waste streams.

The Benefits and Results

The original baseline strategy for treatment of the TRU waste liquids at Rocky Flats consisted of developing portable/trailer mounted treatment systems for treatment of aqueous and organic liquids. The projected cost for development and implementation of this alternative was approximately 11 million dollars. In contrast, development and implementation of the NoChar point of generation solidification process for both aqueous and organic waste streams has cost the Site approximately \$700,000, representing a savings of over \$10 million.

An additional benefit, which was not anticipated, has been the applicability of the process for solidification of various TRU tank sludge wastes, as well as, small amounts of incidental liquids found in legacy TRU waste packages.

The following table describes the waste to bonding agent ratios (volume of waste to volume of bonding agent) used for various wastes at Rocky Flats.

Waste to Bonding Agent Volume Ratios

Waste Category ^a	Bonding Agent	Recommended Ratio of Waste to Bonding Agent	Maximum Tested Effective Ratio of Waste to Bonding Agent
Aqueous Waste (less than 1 volume % organic)			
Acidic (pH < 6)	Nochar Acid Bond (A660)	1 : 2	2.4 : 1
Basic (pH > 9) ^b	Nochar Acid Bond (A660)	4 : 1	8.0 : 1
Neutral (pH > 6 and < 9)	Nochar Acid Bond (A660)	4 : 1	8.0 : 1
Spent Cerium Nitrate Solution	Nochar Acid Bond (A660)	1 : 1	3.6 : 1 ^d
Spent Cerium Nitrate Solution Neutralized (pH > 6)	Nochar Acid Bond (A660)	2 : 1	4.6 : 1
Oil/Organic Waste (less than 1 volume % aqueous)			
Oil and/or Organic Waste	Nochar Petro Bond (N990)	1 : 1	1.7 : 1
Mixtures of Aqueous and Oil/Organic Waste			
Mixtures Approximately 50% aqueous	Nochar N962	1 : 1.5	N/A
Unknown Mixtures	Nochar N962	1 : 2	N/A

Table Notes:

- a - The recommended ratios are conservative. Projects may elect to use a less conservative ratio, but should not exceed the highest tested ratio without further testing.
- b - For mixtures of aqueous and oil/organic waste, bench scale testing should be performed to determine the ratio of waste to bonding agent(s). Nochar Petro Bond (N990) and Acid Bond (A660) can be mixed and used together or Nochar N962 can be used to solidify mixtures of aqueous and oil/organic waste.
- c - A strong ammonia smell is generated when basic waste is solidified with Nochar Acid Bond. Appropriate PPE should be worn when solidifying basic waste.
- d - 4.6 grams of Mg(OH)₂ was added to 22.5 grams of Acid Bond before mixing with surrogate cerium nitrate solution



Technology Supporting Paths to Closure

For more information about Technology at Rocky Flats, contact Dave Maloney, Kaiser-Hill Company, (303) 966-7566, or Dave Hicks, DOE, Rocky Flats Project Office (303) 966-3122

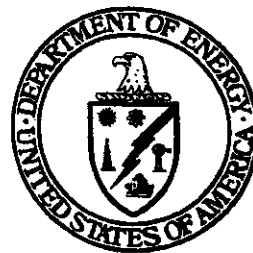


INNOVATIVE TECHNOLOGY

Summary Report DOE/EM-0598

Nochar Petrobond® Absorbent Polymer Tritiated Oil Solidification

Deactivation and Decommissioning Focus Area



Prepared for
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Office of Environmental Management
Office of Science and Technology**

September 2001

SECTION 1 SUMMARY

EXECUTIVE SUMMARY

This report provides an analysis of the cost and performance of the Nochar PetroBond® absorbent polymer technology. The Nochar PetroBond® technology was demonstrated at the Mound Large-Scale Demonstration and Deployment Project, in Miamisburg, Ohio, to determine whether it can be used as an absorbent and solidification agent for high-activity tritium vacuum pump oils, thus replacing current baseline methods and technologies at Mound. The Nochar PetroBond® absorbent is a polymer solidifying agent offered by the Nochar, Incorporated. The purpose of this absorbing agent is to perform safe, efficient solidification of radioactive or mixed-waste oils and provide an acceptable means of transportation and disposal. Nochar PetroBond® polymer crystals have been found to be nontoxic, non-biodegradable, and incinerable to less than 0.02% ash with an absorbent capacity of up to 15:1 (oil-to-solidification agent ratio by weight).

In all phases of the demonstration, the Nochar PetroBond® agent formed an acceptable solidified matrix with waste oils. The toxicity characteristics leaching procedure values were found to be below burial-site limits on specific metals. The product proved very easy to use and required no agitation or mixing, thus mitigating concerns about safety and maintaining toxins at levels that are as low as reasonably achievable. Nochar PetroBond® absorbent polymers were used to solidify 9 gallons of tritiated mixed-waste oil with a mixing oil-to-Nochar PetroBond® ratio of 0.6:1, obtaining an average production rate of 0.23 gallons per minute at a unit cost of \$800 per gallon of waste oil.

Introduction

The U.S. Department of Energy (DOE) continually seeks safer and more cost-effective technologies for use in decontamination and decommissioning (D&D) of nuclear facilities. To this end, the Deactivation and Decommissioning Focus Area of the DOE Office of Science and Technology (OST) sponsors Large-Scale Demonstration and Deployment Projects (LSDDPs). The DOE National Energy Technology Laboratory manages the LSDDPs, where developers and vendors of improved or innovative technologies showcase products that are potentially beneficial to the DOE projects and others in the D&D community. Benefits sought include decreased health and safety risks to personnel and the environment, increased productivity, and decreased cost of operation.

The Mound facility, in Miamisburg, Ohio, is an ideal candidate for the LSDDP because its closure requires the D&D of a large number of radioactively contaminated facilities. The tritium operations areas in the T building and the SW/R building complex are on the critical path for this closure project.

As safe shutdown operations continue at the Mound facility, innovative technologies are needed to increase the effectiveness of D&D operations and to decrease overall costs and personnel exposure at the Miamisburg Environmental Management Project (MEMP). Significant inventories of tritiated oil from the operation of hundreds of glove boxes and associated pumps, along with the large quantities of tritium that were inventoried at Mound, present a major challenge in meeting the MEMP goals. The challenge in handling and disposal of tritiated oil has evolved as a two-part task:

- The first is a short-term task dealing with the backlog of tritiated waste oil. This oil backlog is restricting the required change from vacuum and vane pump oil in the Main Hill tritium safe shutdown areas. When the pump oil is not changed, it accumulates even higher levels of tritium and hazardous materials.
- The second task involves the long-term disposition or disposal of the oil as mixed waste, including high-activity tritium (HAT) oils.

Innovative Technology

The Nochar PetroBond® absorbent product is a proven oil spill and cleanup technology used by major corporations and many governments. The Nochar PetroBond® polymer crystals have been found to be nontoxic, non-biodegradable, and incinerable to less than 0.02% ash with an absorbent capacity of up to 15:1 (oil-to-solidification agent ratio by weight). Nochar PetroBond® bonds petroleum-based liquids into a carpet-like mass, resulting in waste minimization. The product initiates a mechanical process in which the oily waste or lubricant undergoes polymerization, locking the waste material in a matrix of crystals. Nochar PetroBond® comes in various formulations. Those used during this demonstration were the A610, A650, and A660 formulations (Figure 1) and the newly formulated N990. Table 1 provides a quick overview of these bonding agents.

Table 1.
Overview of Nochar PetroBond® Agents Tested

	A610	A650	A660	N990
Description	Granulated polymer that solidifies petroleum-based liquids into large bonded pieces, resulting in waste minimization	Granulated polymer that bonds hydrocarbon-based liquids such as oil, fuels, and solvents	Granular polymer that stabilizes acid spills by bonding them into a solid waste, providing waste minimization	Granulated polymer that solidifies petroleum-based liquids into large bonded pieces, resulting in waste minimization
Problem	Petroleum or hydrocarbon-based spills	Petroleum or hydrocarbon-based spills	Acid-based spills	Petroleum or hydrocarbon-based spills
Action	Solidifies spill on land or water	Solidifies spill on land or water	Gels or solidifies spill	Solidifies spill on land or water
Result	Large, solid pieces	Solid, carpet-like mass	Gelled or solid pieces, depending on acid	Solid, carpet-like mass
Pick-up ratios*	1:15 by weight	1:10 by weight	Varies with acid	Varies with type of hydrocarbon (1:1 to 5:1 by weight)
Reaction time*	Good	Good	Varies with acid	Good
Fire retarded	No	No	No	No
Packaging	3-lb (1.4-kg) shaker 40-lb (18.2-kg) drum 800-lb (363-kg) bulk box	4-lb (1.8-kg) shaker 40-lb (18.2-kg) drum 900-lb (408-kg) bulk box	4-lb (1.8-kg) shaker 40-lb (18.2-kg) drum 400-lb (181-kg) bulk box	40-lb (18.2-kg) drum 1000-lb (454-kg) bulk box

*Varies with chemical properties, viscosity, concentration, temperature, and desired degree of solidification of the liquid being bonded.

Table B.3.
Phase I: Bench-Scale Test 2 Data Results

Sample No.	Container Size, ml	Solidification Agent	Oil Type	Container Weight, g	Amount of Nochar Required, g	Weight of Container + Nochar	Oil Initial Volume, ml	Nochar Initial Volume, ml	Weight of Oil, g	Actual Amount of Nochar Added, g	Weight of Solid Mass, g	Start Time	Stop Time	Final Volume, ml	Ratio of Oil to Nochar Used	Pass/Fail	Comments
5/12/99																	
1	125	Formula	Duo/Wat	121	24	145	N/A	100	24	24	48	1445	1630	105	1/1	P	
2	125	Formula	Duo/Wat	120	17	137	N/A	60	34	17	51	1452	1630	105	2/1	P	
3	125	Formula	Duo/Wat	121	18	139	N/A	60	54	18	72	1501	1630	105	3/1	P	
4	250	610-V	Duo/Wat	193	44	237	N/A	190	44	44	88	1522	1630	240	1/1	P	
5	250	610-V	Duo/Wat	193	36	229	N/A	130	72	36	108	1536	1630	240	2/1	P	
6	125	N/A	DuoSeal	N/A	N/A	N/A	125	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Baseline oil sample
5/19/99																	
7	50	Formula	Synth	87	14	101	N/A	50	28	14	42	1331	1700	50	2/1	P	
8	50	610-V	Synth	87	13	100	N/A	50	13	13	26	1345	1700	50	1/1	P	
9	50	650-V	Synth	86	22	108	N/A	50	22	22	44	1402	1700	50	1/1	P	

Duo, DuoSeal oil; N/A, not applicable; Synth, synthetic oil; V, virgin product; Wat, water.

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RESPONSE TO COMMENTS

This document has been prepared in accordance with Tennessee Rule 1200-1-11-.07(7)(j). It has resulted from the Tennessee Division of Solid Waste Management's issuance of a draft hazardous waste storage permit to U.S. Department of Energy and Lockheed Martin Energy Systems, Inc., Oak Ridge National Laboratory, P.O. Box 2008, Oak Ridge, Tennessee 37831-6269, Installation I.D. Number TN1 89 009 0003. The draft permit proposed is to allow the operation and maintenance of storage units at the Oak Ridge National Laboratory. The wastes are stored in building units namely 7855, 7883, 7884, 7578, 7579, 7572, 7574, 7576, 7577, 7580, 7823, 7842, 7878, 7879, and 7824. Part A of this document describes the efforts made by the Tennessee Division of Solid Waste Management (DSWM) to obtain public input. Part B summarizes and responds to all significant comments received.

A. Public Involvement Opportunities

DSWM issued a public notice of the issuance of the draft permit on the August 13 and August 20th, 1997, editions of The Oak Ridger, The Knoxville News-Sentinel, and The Roane County News and the August 20, 1997, edition of the Farragut Press Enterprise plus the Department's Web Page and area radio stations. The Public Notice advised the public that copies of the draft permit and associated materials were available for review at DSWM's Knoxville Field Office, Oak Ridge Public Library, Oak Ridge, Tennessee and at the Tennessee Department of Environment and Conservation, Department of Energy (DOE) Oversight Division Office in Oak Ridge, Tennessee. The Notice also established a 45-day comment period (ending September 26, 1997) and described how interested persons could comment in writing on the proposed action. It further described a public hearing to be held at the Grand Conference Room of Tennessee Department of Environment and Conservation at Emory Valley Road in Oak Ridge on August 16, 1997, to also receive comments from the public. The public hearing was adjourned at approximately 8.00 p.m., August 16, 1997. One member from the public attended.

B. Public Comment/Response Summary

One oral comment received from the public during hearing. Comments received were from DOE and two members of the public and they are addressed in the following pages.

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Comments from DOE:

General Comments

1. **Comment:** According to the Co-operator Agreement, the U.S. Department of Energy (DOE) owns and operates, and Lockheed Martin Energy Systems, Inc. (LMES) co-operates, the treatment, storage, and disposal (TSD) units located at ORNL. Lockheed Martin Energy Research Corporation (LMER) provides the personnel to manage the units for DOE and LMES in accordance with the terms of this permit. As such, "Lockheed Martin Energy Research Corporation" has been changed to "Lockheed Martin Energy Systems, Inc." where the references involve naming the "Co-Operator." (See Specific Comments below for exact locations of these changes.)

Response: State agrees. Change made per request.

2. **Comment:** ORNL requests that the Tennessee Department of Environment and Conservation (TDEC) approve each of the waivers requested throughout the draft permit. Details of language changes and exact locations of waiver requests in Section I through III and some of the attachments are outlined as specific comments below. In general, these waivers are needed for ORNL to operate these units to comply with Atomic Energy Act (AEA) requirements. Strict compliance with the Resource Conservation and Recovery Act (RCRA) would increase radiological exposures to employees and violate the basic tenet of keeping radiological exposure to as low as reasonably achievable (ALARA) under both AEA standards and DOE policies. Per Federal Register 52: 15937-15941 (May 1, 1987), RCRA is to yield to the AEA where application of both regulatory regimes proves conflicting.

Response: State agrees. Change made per request.

3. **Comment:** The proposed language in the draft permit regarding ORNL's handling of on-site and/or off-site waste does not reflect the existing agreement regarding acceptance of off-site wastes for all of the DOE facilities on the Oak Ridge Reservation (ORR). The context of that agreement (dated August 5, 1993) is outlined in Attachment 1, Section 1-1. The references to "on-site"/"off-site" waste are located throughout Sections I through III. (See Specific Comments below for exact locations.) ORNL requests that the restriction to receive only on-site wastes be modified to reflect that agreement throughout the permit. Suggestions for changing the permit language concerning acceptance of off-site wastes from other DOE facilities, as per the above referenced agreement, are detailed in the Specific Comments.

Response: State agrees. Change made per request.

4. **Comment:** ORNL is proposing numerous changes (see Specific Comments below for details) in Attachment 4, "Personnel Training"; Appendix 4-1, "Job Descriptions"; and Appendix 4-2, "Training Content." The intent of these changes is to make these sections consistent with the comparable sections in ORNL's other RCRA permits (TNHW-027 and TNHW-010A) and to reduce the number of modification requests that have no substantive value and the consequent needless expenditure of DOE and state resources.

Response: State agrees. Change made per request.

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5. **Comment:** TDEC has accepted ORNL's request in comments on a prior draft permit (TNHW-010A) that TDEC acknowledges the use of process knowledge as a legitimate method for meeting waste analysis requirements to determine the hazards involved with managing the hazardous and/or mixed wastes. ORNL requests concurrence that this also applies to this TRU and Class III/IV permit.

Response: State agrees. Change made per request.

6. **Comment:** TDEC has responded to ORNL's comments on a prior draft permit (TNHW-010A) concerning the regulatory status of the 25 carbamate wastes that were vacated on November 1, 1996 [Diothiocarbamate Task Force v. Environmental Protection Agency 98 F.3d 1394 (D.C. Cir. 1996)] by stating "[TDEC]...has decided not to regulate the 25 waste codes vacated under those actions as hazardous." ORNL assumes that this decision also applies to this TRU and Class III/IV permit.

Response: State agrees. Change made per request.

7. **Comment:** ORNL requests that TDEC approve the WEAFF as a permitted activity, as requested in the permit application, and not as a permitted storage unit. The WEAFF (Building 7824) is only used for short-term staging of mixed waste in support of ORNL waste acceptance criteria (WAC) verification. ORNL is proposing to extend the WEAFF function to cover other ORR wastes and to provide enhanced waste characterization functions for those wastes. The basis for ORNL's position is as follows:

- 1) The WEAFF is not a waste storage unit. Instead, it serves a function that is virtually identical to an analytical laboratory. While it is true waste materials are held for brief periods at the WEAFF before and after analysis, this temporary staging is solely incidental to the WEAFF analytical processes. Therefore, requirements pertaining to waste storage units are inapposite. On the other hand, WEAFF operations should be subject to appropriate requirements to protect health and the environment in view of the types of waste staging and analytical activities that are being conducted at the facility.
- 2) The WEAFF provides radiological verification and characterization data which is necessary to meet Atomic Energy Act (AEA) requirements, waste shipping requirements, and waste treatment requirements.
- 3) Waste containers are not opened at the WEAFF. The entire container is assayed, which reduces the opportunity for spills and keeps the radiological exposures ALARA.
- 4) The WEAFF function is needed to comply with requirements of the Site Treatment Plan for the Oak Ridge Reservation which is required by the October 1, 1995 Commissioner's Order (Case Number 95-0514) to support future treatment of land disposal restricted mixed waste.

Response: State agrees. Changes made per request.

8. **Comment:** The waste staging capacity for the WEAFF is being increased to 5,500 gallons to facilitate reduced handling of waste containers. It is more efficient to assay a truck load of waste containers at one time than to have many smaller container movements (also reduces the likelihood of spills or accidents). Comments throughout the draft permit reflect this expanded use of the WEAFF.

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Response: State agrees. Change made per request.

General Editorial Comments

9. **Comment:** Since the same footnote is referenced more than one time on the same page in many sections of the document, footnote numbers throughout the entire document were modified so that new footnote numbers begin on each page.

Response: State agrees. Changes made per request.

10. **Comment:** Punctuation and spacing changes have been made throughout the draft permit and are not summarized herein, but are noted in the redline/strikeout copy.

Response: State agrees. Change made per request.

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Specific Comments

Comment Number	Page	Section	Comment
11	1	"Hazardous Waste Management Permit"	"Lockheed Martin Energy Research Corporation" has been modified to read "Lockheed Martin Energy Systems, Inc." in this section to reflect the Co-operator Agreement between DOE and Lockheed Martin Energy Systems, Inc.
12	2	Response:	State agrees. Change made per request.
			The effective dates of the permit have been modified to make the effective date "1997" and ending date "2007."
		Response:	State agrees. Change made per request.
13	I-1	Section I: STANDARD CONDITIONS	"Lockheed Martin Energy Research Corporation" has been modified to read "Lockheed Martin Energy Systems, Inc." in this section to reflect the Co-operator Agreement between DOE and Lockheed Martin Energy Systems, Inc.
14	I-1	Response:	State agrees. Change made per request.
		I.A. <u>EFFECT OF PERMIT</u>	See General Comments, Number 3, regarding the existing agreement for acceptance of off-site wastes. Replace "on-site generated" with "(per Attachment 1, Section 1-1)" in the first line in I.A.
		Response:	State agrees. Change made per request.

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- 15 I-2; I-4 I.C.: DEFINITIONS The terms "Area of concern," "Corrective action," "Corrective action management units," and "solid waste management units" imply RCRA corrective action requirements will be attached to this permit. However, there is no specific language (normally presented as Section V) outlining TDEC's intent regarding the RCRA corrective action requirements. ORNL requests TDEC clarify the applicability of these corrective action terms to the balance of the permit or it requests an opportunity to review new language inserted into the final permit that defines TDEC authority over RCRA corrective actions at ORNL or on the ORR.
- Response:** State disagrees. The definitions shall remain in the permit. It is understood that the ORR corrective action requirements are in another ORNL permit.
- 16 I-7 I.D.11(a) and (b):
GENERAL DUTIES
AND
REQUIREMENTS:
Reporting
Requirements
Response: The draft permit requires reporting of planned changes or anticipated noncompliances at the permitted facility. ORNL understands that, for purpose of compliance with this part, the permitted facility is limited to the specific TRU and Class III/IV units identified in this permit.
- Response:** State disagrees. Because other items such as security are regulated by this permit, applicability would be determined at time of change or incident.
- 17 I-10 I.F. DOCUMENTS
TO BE
MAINTAINED AT
THE FACILITY ORNL requests clarification that the subject required records (documents) can be maintained at ORNL and each of the respective individual units listed in the permit do not have to maintain copies of each of the documents listed in this section.
- Insert "(ORNL)" after "the facility" in the heading and in the first line in I.F.
- Response:** State agrees. Change made per request.
- Section II:
 GENERAL
 FACILITY
 CONDITIONS

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| 18 | II-1 | | "Lockheed Martin Energy Research Corporation" has been modified to read "Lockheed Martin Energy Systems, Inc." in this section to reflect the Co-operator Agreement between DOE and Lockheed Martin Energy Systems, Inc. |
| | | Response: | State agrees. Change made per request. |
| 19 | II-1 | <u>II.A. HAZARDOUS WASTES TO BE MANAGED</u> | See General Comments, Number 3, regarding the existing agreement for acceptance of off-site wastes. Delete "and generated from on-site," delete "either," and delete "or generated from off-site" in II.A. |
| | | Response: | State agrees. Change made per request. |
| 20 | II-1 | <u>II.C.1. SAMPLING, ANALYSIS AND MONITORING: General Waste Analysis</u> | See General Comments, Number 5, regarding TDEC's prior acceptance of ORNL's request that TDEC acknowledges the use of process knowledge as a legitimate method for meeting the waste analysis requirements and to determine the hazards involved with managing the hazardous and/or mixed wastes. Insert "and/or knowledge of the process that generated the waste" following "representative sample of the waste" in the first sentence in II.C.1. |
| | | Response: | State agrees. Change made per request. |
| 21 | II-1 | <u>II.C.2.(a): Waste Analysis Plan</u> | Modification of the permit should be limited to those changes in the forms that delete the RCRA-mandated information. Insert "RCRA-mandated" after "any deletion of" in the last sentence in II.C.2(a). |
| | | Response: | State agrees. Change made per request. |
| 22 | II-2; II-3 | | Insert "shipments from" before "off-site" in C.2.(b)(v), C.2.(c), and C.3.(b) for clarification. |
| | | Response: | State disagrees. The language in the permit comes directly from Tennessee Rule 1200-1-11-.06(2)(d)2(v), 3, and 1(iii)(II), respectively, and is not necessary for clarification. |

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| 23 | II-4 | II.D.2.(c):
SECURITY | <p>ORNL requests that this requirement be deleted in its entirety, because there is no regulatory basis for it. Signage has typically been ordered in lots and pre-existing signs with the alternative wordings are in storage awaiting use. Since the wording conveys the appropriate message to restrict access, there is no reason to not allow the use of signs with alternative wordings.</p> <p>Response: State disagrees. Language to remain and any additional signs to be ordered must convey the regulated language.</p> |
| 24 | II-4 | II.E.1.(a): <u>GENERAL INSPECTION REQUIREMENTS: Inspection Schedule</u> | <p>The use of the term "facility" is unclear. ORNL requests "the facility" be replaced with "the units where containers are stored" in II.E.1.(a) for clarity.</p> <p>Response: State disagrees. The permit encompasses items outside units such as area security.</p> |
| 25 | II-4 | II.E.1.(c): <u>Inspection Schedule</u> | <p>Attachment 3 defines when "daily when in use" (or "daily during use") inspections are to be conducted. If undefined, "daily when in use" could be interpreted to mean any day when hazardous wastes are stored and, for some units, would translate to conducting inspections every day (365 days per year) and would be in direct with 10 CFR 962 and ALARA. ORNL requests the second sentence be deleted.</p> <p>Response: State disagrees. The referenced sentence applies only to loading and unloading activities.</p> |
| 26 | II-4 | II.E.3. <u>Inspection Records</u> | <p>Modification of the permit should be limited to those changes in the inspection records that delete RCRA-mandated information. Insert "RCRA-mandated" after "any deletion of" in the first sentence in II.E.3.</p> <p>Response: State disagrees. Text presented on the inspection records has been determined to be required to meet RCRA requirements.</p> |

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- 27 II-7 II.H.1.
PREPAREDNESS
AND PREVENTION:
Operation/
Maintenance of the
facility
- Response:
- Replace "facility" with "units" in II.H.1.
- 28 II-7 II.H.2.
PREPAREDNESS
AND PREVENTION:
Required Equipment
- Response:
- State disagrees. See response to number 24 above.
- ORNL, as a facility, maintains the required equipment listed for preparedness and prevention (internal communications systems, radios, and water/foam supplies). However, a specific waiver for emergency equipment was requested for the units when storing TRU, high-activity LLW, or Class III/IV hazardous wastes. The basis for the waiver is outlined in Attachment 2, Section 2-1b. The request for waiver is justified given the radiation levels inside the units or immediately outside the units when storing the specified higher-activity wastes and based on the nature of the wastes stored: typically solids with low flammability. Thus, required equipment is maintained near the units so they will not be radiologically contaminated before use. The waiver covers:
- "portable fire extinguishers, fire control equipment (including special extinguishing equipment such as form, inert, gas, or dry chemicals), spill control equipment, and decontamination equipment."
- ORNL requests TDEC approve the waiver in Attachment 2, Section 2-1b and recognize the waiver in II.H.2:
- Insert "TDEC has approved ORNL's request for waivers for storage of preparedness and prevention equipment at the units when storing TRU, high-activity LLW, or Class III/IV wastes (refer to Attachment 2, Section 2-1b)" as the first sentence in II.H.2. Insert "ORNL" in place of "the facility" in II.H.2.
- State agrees. Change made per request.

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29 II-8 II.H.5. Required Aisle Space Specific waivers for aisle space were requested for the RH-TRU and Class III/IV units. The requested waivers are outlined in Attachment 3, Section 3-1a. The request for waivers is justified given the design of the units (for radiation controls); the restricted access to the units when storing these wastes (due to radiation levels inside the units); and the stored wastes are mostly solids with a low flammability and spill potential. Personnel access is not allowed because of high radiation levels and the need to keep radiation exposures to ALARA levels. In the RH-TRU units, bays will be sealed when they are filled to capacity, thereby preventing access. The stored wastes are predominantly solids, have multiple layers of containment, and are not flammable. The outer container (cask) is made of concrete and is designed for long-term compatibility of the wastes. To date, ORNL has not experienced a spill/release of hazardous waste in a RH-TRU storage unit that was caused by a deteriorating cask.

The Class III/IV units are designed to store solids, and will not store flammables. The unit design provides double containment for the wastes, and the containment system is designed for long-term compatibility of the wastes. Thus, it will be unlikely that emergencies will arise requiring fire protection or spill control equipment at these units.

ORNL requests TDEC approve the waivers in Attachment 3, Section 3-1a and recognize the waiver in II.H.5.

Insert "TDEC has approved ORNL's request for waivers of the aisle space requirements for storage at RH-TRU or Class III/IV wastes (refer to Attachment 3, Section 3-1a)" as the first sentence in II.H.5. Insert "as required in Attachment 3" after "maintain aisle space" in the second sentence in II.H.5.

Response:

State agrees. Change made per request.

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| 30 | II-9 | II.I.3.(c)
<u>CONTINGENCY
PLAN: Content of the
Contingency Plan</u> | Since ORNL maintains emergency response personnel [the Laboratory Shift Superintendent (LSS)] on-site 24-hr per day and off-duty LSS personnel have no direct responsibilities in an emergency, ORNL is requesting the following change for clarity: delete "and home" in the first sentence; replace the second sentence "Where more than one person is listed...others must be listed in the order in which they will assume responsibility as alternates" with "The emergency coordinator on duty will be the primary emergency coordinator; off-duty LSS personnel have no primary responsibility to respond to emergencies." |
| | | Response: | State agrees. Change made per request. |
| 31 | II-10 | II.I.4. <u>Copies of the
Plan</u> | Replace "the facility" with "ORNL" in the first sentence in II.I.4. (See Specific Comments, Number 14.) |
| | | Response: | State agrees. Change made per request. |
| 32 | II-16 | II.K.1(h)
<u>RECORDKEEPING
AND REPORTING
Operating Record</u> | ORNL requests that this requirement be deleted and replaced with "Reserved." DOE facilities are exempt from the financial requirements under RCRA. Inserting "Reserved" will hold this space open for this requirement to be inserted at a later date if it becomes applicable. |
| | | Response: | State agrees. Change made per request. |
| 33 | II-18 | II.K.4.(c)(vi)
<u>RECORDKEEPING
AND REPORTING
Annual Report</u> | ORNL requests that requirement II.K.4.(c)(iv) be deleted and replaced with "Reserved." DOE facilities are exempt from the financial requirements under RCRA. Inserting "Reserved" will hold this space open for this requirement to be inserted at a later date if it becomes applicable. |
| | | Response: | State agrees. Change made per request. |
| 34 | II-19 | II.L.1.(b) <u>CLOSURE:
Performance Standard</u> | Replace "facility" with "permitted units" in II.L.1(b). |
| | | Response: | State agrees. Change made per request. |

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| 35 | II-23 | <u>II.L.7 CLOSURE
Certification of
Closure</u> | Revise the last sentence in II.L.7 (continued from the previous page) to read: "... releases the permittee from the closure requirements per subsection II.L and Attachment 6." |
| | | Response: | State agrees. Change made per request. |
| 36 | II-23
through
II-27 | <u>II.N. FINANCIAL
REQUIREMENTS</u> | Since federal facilities (i.e., DOE) are not subject to the financial requirements of RCRA, delete the text of paragraphs 2 through 10. |
| | | Response: | State agrees. Change made per request. |
| 37 | II-28 | <u>II.P. AIR EMISSION
STANDARDS FOR
PROCESS VENTS</u> | ORNL requests that the text in II.P of the draft permit be deleted because it is not applicable for the units covered by this permit. ORNL's Part B Permit for the Hazardous and Mixed Waste Storage Units (TNHW-010A) already includes requirements for compliance with Subparts AA and BB. Thus, the existing permit already covers any future on-site hazardous waste recycling units that would be regulated under Subparts AA or BB. If left as written, those recycling units would be regulated under both permits and could create confusion regarding applicable permit conditions for those recycling units. |
| | | | Insert the following paragraph as II.P. |
| | | | "Not applicable. ORNL's Part B Permit for the Hazardous and Mixed Waste Storage Units (TNHW-010A) already includes requirements for compliance with Subparts AA and BB [Rule 1200-1-11-.06(30)] for on-site hazardous waste recycling units. The TRU and Class III/IV units covered by this permit are container storage units and do not include any process vents regulated under the requirements of Rule 1200-1-11-.06(30). Therefore, this subsection is not applicable. This permit would be modified if the operations in the permitted units change causing them to be regulated under Subparts AA and BB." |
| | | Response: | State agrees. Change made per request. |

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38 II-30 II.Q. AIR
EMISSION
STANDARDS FOR
EQUIPMENT
LEAKS

ORNL requests clarification on TDEC's position regarding the EPA's November 25, 1996, exclusion from Subpart BB standards for equipment that contacts hazardous waste (with organic concentrations of 10 percent or greater by weight) for a period of less than 300 hours per calendar year. Does TDEC intend to fully regulate such equipment until such time that TDEC regulations are changed to reflect the EPA exclusion?

Delete the text in II.Q and insert "Not applicable; refer to II.P (above)."

Response:

The above exclusions may be effective in November 1997.

Section III:
SPECIFIC
CONDITIONS FOR
STORAGE IN
CONTAINERS

39 III-1

"Lockheed Martin Energy Research Corporation" has been modified to read "Lockheed Martin Energy Systems, Inc." in this section to reflect the Co-operator Agreement between DOE and Lockheed Martin Energy Systems, Inc.

Response:

State agrees. Change made per request.

40 III-1 III.A.2. WASTE
IDENTIFICATION

Replace "880" for Building 7824 with "5,500." Refer to General Comments, Number 8, for justification.

Response:

State agrees. Change made per request.

41 III-2 III.A.3. WASTE
IDENTIFICATION

See General Comments, Number 3, regarding the existing agreement for acceptance of off-site wastes. Delete "or that is not generated on-site" in line 2.

Response:

State agrees. Change made per request.

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42 III-2 III.D.4.
MANAGEMENT OF
CONTAINERS

Insert the following phrase at the end of the existing sentence: "or place the containers on a sloped floor to drain and remove liquids." 40 CFR 264.175(b)(2) and TN 1200-1-11-.06(9)(f)2(ii) allows either sloped floors or elevated containers.

Response:

State agrees. Change made per request.

43 III-2 III.D.5 and 6
MANAGEMENT OF
CONTAINERS

Specific waivers for aisle space were requested for the RH-TRU or Class III/IV units. The requested waivers are outlined in Attachment 3, Section 3-1a. The request for the waivers is justified given the restricted access to the units when storing these wastes (due to radiation levels inside the units); the stored wastes are mostly solids with a low flammability and spill potential; and due to the design of the units (for radiation controls).

ORNL requests TDEC approve the waivers in Attachment 3, Section 3-1a and recognize the waiver in III.D.5.

Insert the following sentence at the beginning of III.D.5:

"TDEC has approved ORNL's request for waivers of aisle space requirements for the RH-TRU or Class III/IV waste storage units (refer to Attachment 3, Section 3-1a)."

Insert "as required in Attachment 3" after "maintain aisle space" and change "7" to "3" in the second sentence of III.D.5.

Delete the existing sentence in III.D.6 and insert: "Where applicable in Attachment 3, Section 3-1a, the permittee shall arrange palletized waste in rows to facilitate inspections of the containers and the base underlying the containers."

Response:

State agrees. Change made per request.

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44 III-3 III.E.1.
INSPECTION OF
THE CONTAINER
MANAGEMENT
UNIT(S)

Specific waivers for weekly inspections were requested for the units when storing RH-TRU, CH-TRU or Class III/IV mixed wastes. The requested waivers are outlined in Attachment 3, Section 3-1a. The request for the waivers is justified given the radiation levels inside the units, the stored wastes are mostly solids with a low flammability and spill potential. Such a waiver has been granted by TDEC for monthly inspections of the CH-TRU wastes stored in Building 7934 which is covered in ORNL's permit TNHW-010A.

Response:

State agrees. Change made per request.

ORNL requests TDEC approve the waivers in Attachment 3, Section 3-1a and recognize the waiver in III.E.1.

Insert the following sentence as the first sentence in III.E.1.

"TDEC has approved ORNL's requested waivers of the weekly inspection requirements for storage of RH-TRU, CH-TRU, high-activity LLW, or Class III/IV wastes (refer to Attachment 3, Section 3-1a)."

Insert "as required in Attachment 3" after "At least weekly"; and insert "low-activity LLW" after "areas where" in the second sentence in III.E.1.

Response:

State agrees. Change made per request.

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45 III-3 III.E.2.
 INSPECTION OF
 THE CONTAINER
 MANAGEMENT
 UNIT(S)

"Each operating day" needs to be defined the same as "daily when in use" to avoid confusion as to when to conduct "daily when in use" inspections in the first line.

Delete "each operating day" and insert "daily when in use (limited to when wastes are moved and loading/unloading areas."

ORNL requests these wording changes to more closely follow the regulatory requirements of 40 CFR 264.176(b)(5) and TN Rule 1200-1-11-.06(9)(f)2(v).

Delete "or accumulated liquid" and insert "waste or accumulated precipitation as described in the examples of inspection checklists for each unit in Attachment 3" at the end of the first sentence in III.E.2.

ORNL requests the second sentence be deleted and the following sentence inserted:

"For the purposes of this permit condition, 'each operating day' (or 'daily during use') is equivalent to "daily when in use" and means when wastes are being moved and, therefore, subject to spills."

Response:

State agrees. Change made per request.

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46

III-3

III.F.1
CONTAINMENT,
DETECTION, AND
MANAGEMENT OF
LEAKS OR SPILLS

Specific waivers for the containment systems were requested for the storage of RH-TRU and high-activity LLW, and the Class III/IV waste storage units. The requested waivers are outlined in Attachment 7, Section 7-1a. The request for the RH-TRU and high-activity LLW waivers is justified because the stored wastes are mostly solids with a low spill potential. In addition, the wastes have multiple layers of containment with the outer containment being a concrete cask which is compatible with the wastes being stored. Such a waiver was granted by TDEC for RH-TRU waste storage in Building 7855 (ORNL's former permit TNHW-055, issued October 1990). The request for the Class III/IV waste waivers is justified because the stored wastes are solids with a very low spill potential.

ORNL requests TDEC approve the waivers in Attachment 7, Section 7-1a and recognize the waivers in III.F.1.

Insert the following sentence as the first sentence in III.F.1.

"TDEC has approved ORNL's request for waivers of the containment system requirements for the RH-TRU and high-activity LLW, and the Class III/IV waste storage units (refer to Attachment 7, Section 7-1a)."

Insert "CH-TRU and low-activity LLW" after "ensure that the" in the second sentence in III.F.1.

ORNL requests that the following language be inserted as the third sentence in III.F.1 as per the ORNL TNHW-010A permit.

"When normal maintenance or replacement of equipment or minor piping rearrangements are necessary to properly operate the facility, the permittee shall use parts or items which meet or exceed the performance standards of those set forth in the attachments. If parts or items are to be used which do not meet or exceed the standards set forth in the attachments, prior approval from the Commissioner shall be required."

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|----|-------|---|---|
| | | Response: | State agrees. Change made per request. |
| 47 | III-3 | III.F.2. | Insert "the CH-TRU and low-activity LLW" after "ensure that" and insert "as indicated in Attachment 7" after "operation" in III.F.2. |
| | | Response: | State agrees. Change made per request. |
| 48 | III-4 | III.F.3. | ORNL requests the following change to more closely follow the regulatory requirements of 40 CFR 264.176(b)(5) and TN Rule 1200-1-11-.06(9)(f)2(v).

Insert "must be removed in as timely a manner as possible as is necessary to prevent overflow of the collection system" after "precipitation" in the first sentence in III.F.3. |
| | | Response: | State agrees. Change made per request. |
| 49 | 1-2 | Attachment 1:
WASTE ANALYSIS
PLAN
1-1 CHEMICAL AND
PHYSICAL
ANALYSES | Replace "classified" with "managed" in the first sentence of the first paragraph for clarity. Renumber footnotes. |
| | | Response: | State agrees. Change made per request. |
| 50 | 1-3 | | Replace "Section H" with "Attachment 4" in the third paragraph to reflect the correct reference. Delete "the" before "plastic buckets" in the second paragraph under <u>Hazardous Characteristics</u> for clarity. |
| | | Response: | State agrees. Change made per request. |

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51 1-5

Table 1-1 "Waste codes for RCRA wastes stored in the RH-TRU, CH-TRU, and Class III/IV units"

Change "Corrosive" to "Corrosivity" in the second column for consistency.

ORNL anticipates high-activity wastes that meet the RCRA definition for reactivity (i.e., D003 wastes) and RH-TRU wastes that contain polychlorinated biphenyls (PCBs) may be encountered during future Decontamination and Decommissioning (D&D) activities. While D003 waste codes are allowed in other ORNL waste storage units covered by permit TNHW-010A, higher-activity (i.e., greater than 10 millirem at the container surface) will be best managed in the CH-TRU units with wastes of similar radioactivity levels. In order to allow this flexibility in the TRU units, insert "D003," and "Reactivity" as the fourth row in Table 1-1 with "Yes" in the CH-TRU column and change "No" to "Yes" in the CH-TRU column and change "No" to "Yes" in the last row for PCB wastes in the RH-TRU units. ORNL does not anticipate the need to store either of these types of wastes (D003 or PCB) in the Class III/IV units.

52 1-6

Response:

CH-TRU Wastes and
Hazardous
 Characteristics

State agrees. Change made per request.

Replace "Section H" with "Attachment 4" in the second sentence to reflect the correct reference and insert "can" following "WO staff" in the fourth sentence of the third paragraph under CH-TRU Waste to better define the function of the WEAf.

Delete "the" before "plastic buckets" in the second sentence of the second paragraph under Hazardous Characteristics for consistency.

Response:

State agrees. Change made per request.

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53 1-8

Insert "or" before and "waste" after "Class III/IV" and delete "or high-activity LLW" after "Class III/IV" in the last sentence of the first paragraph under High-Activity LLW for clarity.

Replace "Section H" with "Attachment 4" in the second sentence to reflect the correct reference; insert "can" after "WO staff" in the fourth sentence to better define the function of the WEAFF; and replace "drums" with "containers" in the fifth sentence of the second paragraph under High-Activity LLW for clarity.

Response:

State agrees. Change made per request.

54 1-9

Replace "Section H" with "Attachment 4" in the second paragraph on the page to reflect the correct reference.

Replace "Table C-1" with "Table 1-1" in the first paragraph under Hazardous Characteristics to reflect the correct table number.

Insert "reactive wastes (D003)" after "corrosive liquids/solids (D002)" in the second paragraph under Hazardous Characteristics to allow ORNL the flexibility to manage high-activity reactive wastes from future D&D activities (See Specific Comments, Number 51.)

Response:

State agrees. Change made per request.

55 1-10

Insert "low-activity" before "LLW" in the first sentence to clarify.

Response:

State agrees. Change made per request.

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56

1-10

1-1a Containers

Insert the following paragraph following the first bulleted list under RH-TRU Waste to allow ORNL the flexibility to manage RH-TRU PCB wastes. (See Specific Comments, Number 51.)

"Some RH-TRU wastes may contain sufficient concentrations of polychlorinated biphenyls (PCBs) to warrant management under the Toxic Substances Control Act (TSCA). These wastes could include solids, liquids, and/or sludges."

Replace "Section 7-1" with "Attachment 7" in the paragraph originally following the first bulleted list under RH-TRU Waste to reflect the correct reference.

Replace "Subparts C and G" with "Subparts D and G" in the second bulleted list under RH-TRU Waste to reflect the correct reference.

Response:

State agrees. Change made per request.

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57 1-11

Delete the following paragraph following the second bulleted list under RH-TRU Waste since this section deals only with RH-TRU waste.

"The SLLW (non-hazardous; soils, spill debris, etc.) will typically be stored in DOT- approved 30 gal or 55 gal drums. The SLLW will be placed in compatible containers by the generator."

Delete "the Toxic Substances Control Act" and the parentheses around "(TSCA)" after "management under" since this acronym has already been defined and delete "and/or RCRA" following "(TSCA)" in the first paragraph following the first bulleted list under CH-TRU Waste to clarify the reference to PCB wastes.

Insert "or" following "mercury, and" in the second sentence of the fourth paragraph following the first bulleted list under CH-TRU Waste to indicate that individual waste containers will not contain all the metals in the reference.

Replace "Subparts C and G" with "Subparts D and G" in the second bulleted list under CH-TRU Waste to reflect the correct reference.

Response:

State agrees. Change made per request.

58 1-12

Replace "Subparts C and G" with "Subparts D and G" in the bulleted list under Class III/IV Waste to reflect the correct reference.

Response:

State agrees. Change made per request.

59 1-13

Replace "Section C-2" with "Section 1-2" in the fourth paragraph following the first bulleted list under High-Activity LLW to reflect the correct reference.

Insert "reactive (D003)" in the first bulleted list under Low-Activity LLW to reflect requirements in the WAC for mixed LLW.

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60	1-14	Response:	State agrees. Change made per request.
			Delete the following paragraph and bulleted list on the page to reflect requirements in the WAC for mixed LLW. "WAC (see Section 1-2) for newly generated low-activity LLW to be stored in any of these units currently <i>exclude</i> the following materials: • D003 reactives; or • K-listed wastes."
61	1-15	Response:	State agrees. Change made per request.
		Table 1-2. "Waste analysis parameters and rationale RH-TRU wastes and Class III/IV wastes"	Renumber the footnotes.
62	1-16	Response:	State agrees. Change made per request.
		Table 1-3. "Waste analysis parameters and rationale CH-TRU and LLW (high-activity and low-activity)"	Renumber the footnotes.
		Response:	State agrees. Change made per request.

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63 1-17 CH-TRU Waste

Delete the first two sentences in the third paragraph under CH-TRU Waste:

"CH-TRU waste will be examined at the WEAf for compliance with the ORNL WAC. The WEAf serves as the central certification (characterization) unit for both CH-TRU and LLW generated at ORNL."

and replace with the following sentence to better define the function of the WEAf.

"The WEAf serves as a verification facility for characterization of LLW and provides, upon request, enhanced waste characterization of both CH-TRU and high-activity LLW."

Replace "typically serves" with "can serve" in the last sentence of the third paragraph under CH-TRU Waste to better define the function of the WEAf.

Insert the following paragraph after the third paragraph under CH-TRU Waste to better define the function of the WEAf.

"The WEAf is only used for short-term staging of mixed wastes associated with WAC verification and enhanced waste characterization functions. When not in use for RCRA characterization and verification, the WEAf will be controlled by WO staff; RCRA waste or waste residues will not be present."

64 1-18 **Response:**
 Table 1-4. "Examples of forms for radioactive waste storage or disposal"

State agrees. Change made per request.

Replace Appendix "C-5" with "1-5" to reflect the correct reference in footnote 1.

Renumber the footnotes.

Response:

State agrees. Change made per request.

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|----|------|---|---|
| 65 | 1-19 | Table 1-5 "RH-TRU waste storage units acceptance criteria for newly generated RH-TRU waste" | Renumber the footnotes. |
| | | Response: | State agrees. Change made per request. |
| 66 | 1-20 | Table 1-6 "CH-TRU waste storage units acceptance criteria for newly generated CH-TRU waste" | "Transferable" is misspelled in the sixth entry in the table. |
| | | Response: | Renumber the footnotes. |
| | | | State agrees. Change made per request. |

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67 1-21 CH-TRU Waste

The following changes are requested to better define the function of the WEAFF.

Delete the following sentence from the beginning of the first complete paragraph.

"The WEAFF typically serves as one part of the WAC for acceptance of waste into the CH-TRU waste storage units."

Insert "/or" after "complete the assay and" in the second sentence of the first complete paragraph; delete "ORNL does not intend to use" before "WEAFF"; and replace "as" after "WEAFF" with "is not" in the third sentence of the first complete paragraph.

Delete the following sentence from the beginning of the second complete paragraph and combine the first and second paragraphs.

"All wastes containers at the WEAFF are handled in accordance with the "Waste Receiving and Handling Procedure," WMRA-ARM-803.3, that provides guidance on handling and staging waste containers at the WEAFF."

Replace "Appendix 1-5" with "Appendix 1-4" at the end of the second paragraph to reflect the correct reference.

Delete the following third paragraph.

"Special handling is prescribed for TRU wastes co-contaminated with RCRA constituents. Generators are required to label any mixed wastes properly. Also, since early 1990, drums or boxes holding mixed waste have been identified and quantified for repackaging."

Response:

State agrees. Change made per request.

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|----|------|--|--|
| 68 | 1-22 | Table 1-7 "TRU and Class III/IV waste storage units acceptance criteria for newly generated high-activity LLW" | <p>"Transferable" is misspelled in the fifth entry in the table.</p> <p>Renumber the footnotes.</p> |
| 69 | 1-23 | <p>Response:</p> <p><u>High-Activity LLW</u></p> | <p>State agrees. Change made per request.</p> <p>The following changes are requested to better define the functions of the WEAf.</p> <p>Replace "Like CH-TRU waste," with "A percentage of the" at the beginning and delete "both NDAs and" after "ORNL WAC using" in the first sentence in the first paragraph.</p> <p>Insert the following sentence as the third paragraph.</p> <p>"The WEAf can serve as a verification and enhanced waste characterization unit for low-activity LLW."</p> |
| 70 | 1-24 | <p>Response:</p> <p>Table 1-8 "TRU waste storage units acceptance criteria for newly generated low-activity LLW"</p> | <p>State agrees. Change made per request.</p> <p>"Transferable" is misspelled in the fourth entry in the table.</p> <p>Delete the seventh entry in the table, "No reactive waste may be stored" to reflect requirements in the WAC for mixed LLW.</p> <p>Renumber the footnotes.</p> |
| 71 | 1-25 | <p>Response:</p> <p><u>Class III/IV Waste</u></p> | <p>State agrees. Change made per request.</p> <p>Replace "has" with "will" in the first sentence, and replace "is" with "will not be" in the last sentence under <u>Class III/IV Waste</u> to clarify.</p> |
| 72 | 1-29 | <p>Response:</p> | <p>State agrees. Change made per request.</p> <p>Renumber the footnote.</p> |

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		Response:	State agrees. Change made per request.
73	1-30	1-2f <u>Additional Requirements for Units Handling Ignitable, Reactive, or Incompatible Waste</u>	<p>Delete the following sentence from the end of the fourth paragraph since this reference location is not included in the draft permit.</p> <p>"Section F-5a discusses the procedures used to prevent accidental ignition of the wastes."</p>
		Response:	State agrees. Change made per request.
74	1-2-1 through 1-2-4	Appendix 1-2: TEST METHODS FOR THE CH-TRU WASTE AND LLW	<p>Remove ORNL's filename, "Apend-C2.X10/Rev. 1 7/01/96" from the footer.</p> <p>Renumber the footnotes.</p>
		Response:	State agrees. Change made per request.
75	1-3-1 through 1-3-3	Appendix 1-3: QUALITY ASSURANCE/QUALITY CONTROL	<p>Remove ORNL's filename, "Apend-C2.X10/Rev. 1 7/01/96" from the footer. The changes for Appendix 1-3 are requested for clarity and for consistency with comparable sections in ORNL's other RCRA permits.</p>
		Response:	State agrees. Change made per request.
76	1-3-1	<u>Sampling QA/QC</u>	<p>Insert "an" before "internal audit" in the second bullet of the first list.</p> <p>Insert the following sentence as the second paragraph following the first bulleted list.</p> <p>"EM has a staff position to oversee all QA functions."</p>

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Replace "is approved by EPA" with "follows EPA guidelines" and delete "by the section" from the first sentence; and insert "chain-of-" before "custody" in the second sentence of the first paragraph under "EM Sample Management."

Delete "maintained" following "field measurements are"; insert "maintenance" following "routine"; and insert "are" before "calibrated in the first sentence under "Instrument Maintenance/ Calibration."

Delete "ORNL" from the fifth entry in the second bulleted list.

Response:

State agrees. Change made per request.

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77 1-3-2

Insert "generally" following "Methods are" in the last sentence under "Analytical Request Methods."

Replace "discussed with the appropriate party, and a standard form is used to record both the finding and the follow-up discussion" with "placed on an ORNL computer system [Corrective Action Reporting System (CARS)], and follow-up is carried out by the Measurement Assurance Section and the Quality Department" in the second sentence; and insert "also" following "findings are" and replace "an ORNL computer system [Corrective Action Reporting System (CARS)]" with "the ORNL CARS" in the second paragraph under "Sampling Corrective Actions."

Delete "Organization" and replace "(ASO)" with "(AS)" in the first sentence under Laboratory QA/QC.

Replace "ASO" with "AS" in the sentence under "QA Organization."

Delete "The" at the beginning of the first sentence and delete "procedures and augmented by division" following "implemented and augmented by division" in the second sentence of the first paragraph on the page.

Replace "ASO" with "AS" at the beginning of the first sentence of the second paragraph on the page.

Response:

State agrees. Change made per request.

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1-3-3

Data Management

In order to update the permit language to reflect data management activities associated with changes in the computer-based Waste Tracking System, the following changes are requested.

Delete the following paragraphs under Data Management.

"After a waste has been picked up by HWO and transferred to the appropriate on-site storage facility, the Request for Disposal Form associated with that waste is taken to the Documentation Management Center for entry into a computerized tracking system. To ensure correct data entry, all information entered into the system is rechecked against the corresponding form. Any initial data entry errors are corrected during this verification phase. An additional verification of data entry is performed by the EC organization. Approximately once a month, a random selection of Request for Disposal Forms is obtained and compared to the associated information entered into the tracking system. Potential errors or inconsistencies identified by the EC organization are resolved through communications between the HWO and the Documentation Management Center staff. After all necessary information has been entered into the system, the forms, including results of analyses, radiation scans, etc., are filed (by form number) in locked file cabinets.

Periodically, the tracking system is used to verify proper storage of waste (for example, no waste material in a particular storage facility is radioactively contaminated). In addition, several weekly and monthly reports are provided to HWO using the tracking system. Typical reports include storage facility inventories and weights of waste materials on shelves at the storage facilities."

Insert the following paragraph under Data Management.

"After a generator submits the 2109 form set or equivalent to WO, it is reviewed for completeness, corrected if necessary, and submitted to the tracking system. The signed hard copies are then filed. Approximately once a month, a random selection of 2109 form sets is obtained and compared to the associated information submitted and entered into the waste tracking system."

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Response: State agrees. Change made per request.

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Appendix 1-4: ORNL
Waste Examination
and Assay Facility
Operations

Delete "Operations" from the title, and delete duplicate title line.

Replace the text of Appendix 1-4 with the following paragraphs to better describe the functions of the WEAFF.

"TDEC concurs that the WEAFF is being permitted only for short-term staging of mixed waste. This staging function is associated with waste characterization (i.e., analysis) and verification functions conducted in the unit. While doing characterization and verification assays on containers from on-site the WEAFF will typically serve in it's normal role as a part of the waste acceptance criteria (assays are conducted without opening containers). In this situation containers typically can be examined in a normal workday and transferred, within 24 hours of waste receipt at the WEAFF, to permitted storage or returned to the generator for repackaging. Every attempt is made to receive waste containers, complete the assay, and transfer the containers out within three days of receipt. Occasionally, when radiological concerns cause a waste container to be held for further evaluation, the waste could remain in the staging area at the WEAFF for longer than three days.

The WEAFF can be utilized to assist in complying with requirements of the Site Treatment Plan for the Oak Ridge Reservation which is required by the October 1, 1995, Commissioner's Order (Case Number 95-0514) to support future treatment of land disposal restricted mixed waste. An example of when this situation would occur is using the WEAFF as the last step WAC verification (RCRA and/or radiological) of waste stored at Y-12 and/or ETTP prior to shipment for treatment to an off-site facility such as Envirocare. Also, verification of compliance with an on-site WAC for waste coming to the ORR for storage, such as the NFS waste, is another example of the need to use the WEAFF to assay waste containers from off-site. The WEAFF will be operated as a staging unit when verification and enhanced characterization of waste from off-site is being performed. The receipt of waste, from off-site, at the WEAFF will comply with the agreement regarding acceptance of off-site waste for all of the DOE facilities on the ORR. The agreement is dated August 5, 1993 and can be found in Attachment 1, Section 1-1."

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| 80 | | Response:

Appendix 1-5:
Examples of Waste
Forms and Lables
[sic] | State agrees. Change made per request.

Modify title to read "Examples of Waste Forms and Labels" |
| 81 | 1-5-12
and 1-5-13 | Response:

1-5-12
and 1-5-13 | State agrees. Change made per request.

Insert the 2109 form set (two new pages) as pages 1-5-12 and 1-5-13. |
| 82 | 2-1 | Response:

Attachment 2:
SECURITY
SECURITY | State agrees. Change made per request.

Replace "TRU and LLW" following "RCRA basic training," with "waste" in the second sentence of Section 2-1a.

Replace "is" following "the units in SWSA 7" with "will be" in the fourth sentence of Section 2-1a(1). |
| 83 | 2-2; 2-3 | Response:

2-1a(2)(b): <u>Means to Control Entry</u> | State agrees. Change made per request.

The language describing signage or posting of signs has been deleted or modified to better reflect regulatory requirements of 40 CFR 264.14(c). (See Specific Comment. Number 23.)

Delete the following sentence from the end of the first, second, and third paragraphs of Section 2-1a(2)(b). "All site access points are posted specifying controlled entry."

Response: State agrees. Change made per request. |

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84 2-3 2-1a(3): Warning Signs

The language describing signage to restrict unknowing access has been changed to better reflect regulatory requirements of 40 CFR 264.14(c). (See Specific Comment, Number 23.)

Delete "on the entrance gate to SWSA 5, on the security fence around SWSA 5, and" following "are posted" from the first sentence of the first paragraph of Section 2-1a(3).

Delete "on the entrance gate to SWSA 6, on the security fence around SWSA 6, and" following "are posted" from the first sentence of the second paragraph of Section 2-1a(3).

Replace "entrance gate" with "access points" following "posted on the" and delete "on the security fence around each units; and on access points to the building" in the first sentence of the third paragraph in Section 2-1a(3).

Delete "and are visible from all angles of approach," following "distance of 25 ft" and delete "and at locations visible from all approaches to the buildings" following "Building 7883 and 7884" from the sentence in the fourth paragraph of Section 2-1a(3).

85 2-4 Waiver

Response:

State agrees. Change made per request.

Replace "ORNL hereby requests a waiver" with "TDEC approves ORNL's requested waiver" in the first sentence on the page. (See General Comments, Number 2.)

Response:

State agrees. Change made per request.

Attachment 3:
INSPECTION

86 3-1 3-1a General
Inspection
Requirements

Response:

Replace "ORNL hereby requests a waiver" with "TDEC approves ORNL's requested waiver" in the first sentence of the first paragraph. (See General Comments, Number 2.)

State agrees. Change made per request.

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87 3-2

Replace "ORNL hereby requests a waiver" with "TDEC approves ORNL's requested waiver" in the first sentence of the first paragraph. (See General Comments, Number 2.)

Response:

State agrees. Change made per request.

88 3-4

Delete "(refer to Section D for Process Information)" at the end of the first sentence of the second paragraph since this reference location is not included in the draft permit.

Replace "a waiver is requested" with "TDEC approves ORNL's requested waiver" in the fourth sentence of the second paragraph. (See General Comments, Number 2.)

Response:

State agrees. Change made per request.

89 3-5

Table 3-1 "General inspection schedule for RH-TRU and/or LLW to be stored in RH-TRU units"

Insert the following as footnote number 1 following "Base/foundation" in the first column.

"1 Applies to RH-TRU storage areas where waste is accessible (i.e., in open cells only)."

Delete "wet spots," and insert "liquid present in excess of seepage and/or condensate" in the middle column for "Base/foundation" to better define possible problems.

Insert the following as footnote number 2 following "daily during use" in the third column.

"2 'Daily during use' is defined as when wastes are being moved and, therefore, subject to spills."

Delete "wet spots" in the middle column for "Exterior Sump" to better define possible problems.

Insert "monthly for LLW) in the last column for emergency equipment inspections.

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Response:

State disagrees for two items above. The wording wet spots shall remain and requested language "liquid present. . ." shall not be added. ORNL must make hazardous waste determinations on all liquids found.

90

3-7

CH-TRU Units and
WEAF

Insert the following paragraph as the second paragraph under CH-TRU Units and WEAF to better define the function of the WEAF.

"The WEAF is not used for the long-term storage of mixed waste; it is only used for short-term staging of mixed wastes associated with WAC verification and waste characterization functions. Inspections (per inspection log Table 3-8) will be performed when wastes are being staged for characterization."

Delete "and the WEAF" since the WEAF functions are explained in the paragraph inserted above and replace "<" with "≤" for clarity in the first sentence of the original second paragraph.

Replace "Section D for Process Information" with "Attachment 7" to reflect the correct reference.

Replace "a waiver is requested" with "TDEC approves ORNL's requested waiver" in the last sentence of the fourth paragraph. (See General Comments, Number 2.)

Response:

State agrees. Change made per request.

91

3-9

Table 3-2 "General inspection schedule for CH-TRU and/or LLW to be stored in CH-TRU units"

Replace "Interpreted as" with "'Daily during use' is defined as" in footnote number 1 for clarity.

Insert "; monthly for LLW" for emergency equipment inspections.

Renumber the footnotes.

Response:

State agrees. Change made per request.

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92 3-10

Delete "of the Class III/IV wastes" following "Inspections" from the second sentence under Class III/IV Units for consistency with prior sections about the RH-TRU and CH-TRU units.

Insert "(primarily metals)" following "RCRA constituents" in the second paragraph under Class III/IV Units for clarity.

Replace "a waiver is requested" with "TDEC approves ORNL's requested waiver" in the fourth sentence of the third paragraph. (See General Comments, Number 2.)

Response:

State agrees. Change made per request.

93 3-11

Table 3-3 "General inspection schedule for Class III/IV and/or high-activity LLW to be stored in Class III/IV units"

Replace "Interpreted as" with "Daily during use" is defined as" in footnote number 1 for clarity.

Renumber the footnotes.

Response:

State agrees. Change made per request.

94 3-12

Replace Table "3-7" with "3-8" to reflect the insertion of Table 3-8.

Change section number "F-1(a)2" to "3-1(a)2" for consistency.

Replace "Section 3-2a" with "Section 3-1a" to reflect the correct reference and replace "ORNL is requesting a waiver" with "TDEC approves ORNL's requested waiver" in the second sentence under Frequency of Inspection. (See General Comments, Number 2.)

Insert "containers of" before "low-activity LLW" in the last sentence under Frequency of Inspection for clarity.

Response:

State agrees. Change made per request.

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95 3-13 Table 3-4 "Examples
 of inspection log sheets
 for RH-TRU units:
 Weekly"

Delete "wet spots" and insert the following footnote as
 footnote number 2 following "liquid present" in the second
 column for "Exterior sump" for clarity.

"2 Pump once sufficient volume is present (excess of 6
 inches). Liquid should be sampled when volume is sufficient
 for sampling and analysis requirements."

Insert "performed" before "annually" in footnote number 3
 for clarity.

Renumber the footnotes.

Response:

State disagrees to the first item deleting "wet spots." See
 response number 89 above. Other items were changed as
 requested

96 3-14 Table 3-4 (Continued)
 "Examples of
 inspection log sheets
 for RH-TRU units:
 Daily"

Delete "wet spots" and insert "liquid present in excess of
 seepage and/or condensate" in the second column for
 "Base/foundation" for clarity.

Replace "Interpreted" with "'Daily during use' is defined"
 in footnote number 3 for clarity.

Renumber the footnotes.

Response:

State disagrees to the first item deleting "wet spots" and
 inserting "liquid present" See response to number 89
 above. Other items were changed as requested.

97 3-15 Table 3-4 (Continued)
 "Examples of
 inspection log sheets
 for RH-TRU and/or
 high-activity LLW in
 RH-TRU units:
 Monthly"

Renumber the footnotes.

Response:

State agrees. Change made per request.

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98	3-16	Table 3-5 "Examples of inspection log sheets for CH-TRU and/or high-activity LLW in CH-TRU units: Monthly" Response:	Insert "; aisle spacing; height" for container inspections. Renumber the footnotes. State agrees. Change made per request.
99	3-17	Table 3-5 (Continued) "Examples of inspection log sheets for CH-TRU and/or high-activity LLW in CH-TRU units: Monthly" Response:	Replace footnote number 2 with the following for clarity and consistency: "2 Emergency or safety equipment will have a complete inventory performed annually." Renumber the footnotes. State agrees. Change made per request.
100	3-18	Table 3-5 (Continued) "Examples of inspection log sheets for CH-TRU wastes in the CH-TRU units: Daily" Response:	Insert "high-activity LLW or" before "CH-TRU" in the title. Replace "Interpreted" with "'Daily during use' is defined" in footnote number 2 for clarity. Renumber the footnotes. State agrees. Change made per request.
101	3-19	Table 3-6 "Examples of inspection log sheets for low-activity LLW in TRU units: Weekly" Response:	Renumber the footnotes. Insert "where present" for "Portable eye wash" inspections. State agrees. Change made per request.
102	3-20	Table 3-6 (Continued) "Examples of inspection log sheets for low-activity LLW: Monthly" Response:	Renumber the footnotes. State agrees. Change made per request.

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103	3-21	Table 3-7 "Examples of inspection log sheets for the Class III/TV Units: Quarterly"	Renumber the footnotes.
		Response:	State agrees. Change made per request.
104	3-22	Table 3-7 (Continued) "Examples of inspection log sheets for the Class III/TV units: Weekly"	Renumber the footnotes.
		Response:	State agrees. Change made per request.
105	3-23	Table 3-7 (Continued) "Examples of inspection log sheets for the Class III/IV units: Daily"	Replace "Interpreted" with "'Daily during use' is defined" in footnote number 2 for clarity.
		Response:	State agrees. Change made per request.
106	3-24	Table 3-8 "Example of inspection log sheets for the WEAFF (Building 7824)"	Insert new Table 3-8 "Example of inspection log sheets for the WEAFF (Building 7824)" as a new table to cover inspections at the WEAFF when mixed wastes are present.
		Response:	State agrees. Change made per request.
107	3-25	Table 3-8 (Continued) "Example of end use inspection log sheet for the WEAFF (Building 7824)"	Insert new Table 3-8 (Continued) "Example of end use inspection log sheets for the WEAFF (Building 7824)" as a new table to cover inspections at the WEAFF when mixed wastes have been removed.
		Response:	State agrees. Change made per request.

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108 3-26

Change section number from "3-b" to "3-1b" for consistency.

Replace Table "3-7" with "3-8" in the first and second sentences of the first paragraph to reflect the insertion of Table 3-8.

Replace "Table 3-6" with "Tables 3-4 through 3-8" in the last sentence under 3-1b(1) Container Inspection to reference all the inspection log sheet tables.

Replace "Interpreted" with "'During use' is defined" in footnote number 1 for clarity.

Renumber the footnotes.

Response:

State agrees. Change made per request.

109 3-27

Delete the following (first) sentence under Equipment Requirements since this information was provided for TDEC to clarify the permit application and is not needed in the draft permit.

Change section number "F-3b" to "3-3b" for consistency.

Replace "Attachment 3-2a" to "Section "3-1a" in the first and last sentences of the first paragraph under Aisle Space Requirement to reflect the correct reference.

Replace "a waiver" with "TDEC approves ORNL's requested waiver" before "for the aisle space" in the first sentence of the first paragraph under Aisle Space Requirement. (See General Comments, Number 2.)

Response:

State agrees. Change made per request.

110

Attachment 4:
 PERSONNEL
 TRAINING

ORNL is proposing numerous changes (see Specific Comments below for details) in Attachment 4, "Personnel Training"; Appendix 4-1, "Job Descriptions"; and Appendix 4-2, "Training Content." (See General Comments, Number 4.)

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		Response:	State agrees. Change made per request.
111	4-1		Insert the word "PERSONNEL" in the attachment title.
		Response:	State agrees. Change made per request.
112	4-1	4-1a <u>Job Titles and Duties</u>	Delete the words "Actual job titles and" from the beginning of the last sentence under 4-1a, and insert "Job descriptions and examples of".
			Delete the list of building numbers from the end of the last sentence and replace with "the units covered by this permit."
		Response:	State agrees. Change made per request.
113	4-2		Change "Attachment 4-1e" at the end of the paragraph to "Section 4-1e" to reflect the correct reference.
		Response:	State agrees. Change made per request.
114	4-3	Figure 4-1 "Organization chart for personnel involved with hazardous and mixed waste management operations at ORNL."	Revise box for "RCRA Training Energy Systems" to read "ORNL RCRA Training Director" to reflect a title change.
		Response:	State agrees. Change made per request.
115	4-4	4-1b(2) "Self-paced study."	Insert the words "or computer-based" following "Self-paced" in the section title. Insert "or computer-based" following "self-paced" and replace the words "as well as" with "and/or" following "SOPs" in the second sentence. Change the word "procedure" to "procedural" in the last sentence. These changes are required to clarify the training method.
		Response:	State agrees. Change made per request.

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| 116 | 4-6 | H-2
IMPLEMENTATION
AND
DOCUMENTATION
OF TRAINING
PROGRAM | Change section number from "H-2" to "4-2" for consistency. |
| | | Response: | State agrees. Change made per request. |
| 117 | 4-7 | | Delete the words "Inspections and Recordkeeping" following "Attachment 3" in the last sentence to accurately reflect the title of the attachment. |
| | | Response: | State agrees. Change made per request. |
| 118 | 4-8 | Table 4-1 "Regulatory Training Frequency for Treatment Storage and Disposal Personnel" | <p>Renumber the footnotes to begin with "1."</p> <p>To better clarify requirements, insert the word "Approximate" before "training time" and before "retraining time" in the heading for columns 2 and 3; delete the words "(approximate time)" in the line immediately below Table 4-1; and insert the following as footnote number 1.</p> <p>"¹Due to diverse delivery methods (classroom, computer-based, self-study, etc.) and individual differences in student knowledge and capabilities, the completion time for courses will vary."</p> <p>For "Radiation Worker" training, change the "Approximate training time" from "16" to "8" and the "Approximate retraining time" from "12" to "8" to reflect changes in actual time requirements stemming from a reevaluation of the course.</p> <p>Delete the words "Basic for General Site Workers" from the first reference to "SARA/OSHA (HAZWOPER)."</p> <p>Move footnote number 4, "Retraining provided when procedures are changed," to footnote number 6.</p> |
| | | Response: | State agrees. Change made per request. |

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119	4-9	Table 4-2 "Positional Training"	Delete the words "Basic for General Site Workers" from the first reference to "SARA/OSHA (HAZWOPER)."
		Response:	State agrees. Change made per request.
120	4-10	Table 4-3 "Positional Training for WEAFF Personnel"	Since WEAFF personnel have the same training requirements reflected in Table 4-2, "Positional Training," delete Table 4-3.
		Response:	State agrees. Change made per request.
121		Appendix 4-1: Job Descriptions	Although ORNL's Waste Management and Remedial Action Division divides their waste operations into "Hazardous Waste" (HW) and "Radioactive Solid Waste" (RSW), job duties for certain categories of waste management staff (i.e., managers, supervisors, operators, technicians, etc.) are almost identical for both HW and RSW. Therefore, where applicable, job descriptions have been combined and/or simplified.
		Response:	State agrees. Change made per request.
122	4-1-1		The Laboratory Shift Superintendent (LSS) is responsible for the overall coordination of all ORNL-wide emergency situations. Any emergency situations involving hazardous waste spills or possible releases will always involve the Spill Response Team which is directed by Waste Operations personnel and is fully trained in the management of hazardous waste during emergency situations. Since the LSS will always depend on WO personnel in RCRA-related emergency situations, the job description for the LSS has been deleted from all of ORNL's RCRA permits.
		Response:	State agrees. Change made per request.
123	4-1-2, 4-1-3 & 4-1-21		"Hazardous Waste Operations Manager" and "Radioactive Solid Waste Operations Manager" combined into one general job description for "Waste Operations Manager."
		Response:	State agrees. Change made per request.

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| 124 | 4-1-4,
4-1-5,
4-1-14,
4-1-15,
4-1-26
& 4-1-
27 | <p>"Hazardous Waste Operations Technical Staff Supervisor,"
 "Hazardous Waste Operations Field Operations
 Supervisor," and "Radioactive Solid Waste Operations
 Field Operations Supervisor" combined into one general job
 description for "Waste Operations Supervisor."</p> |
| | Response: | State agrees. Change made per request. |
| 125 | 4-1-6,
4-1-7,
4-1-21,
4-1-24
& 4-1-
25 | <p>"Hazardous Waste Operations Technical Staff,"
 "Hazardous Waste Operations Technical Support," and
 "Radioactive Solid Waste Operations Technical Support"
 combined into one general job description for "Waste
 Operations Technical Staff."</p> |
| | Response: | State agrees. Change made per request. |
| 126 | 4-1-8 | <p>"Hazardous Waste Operations Specialized Support"
 simplified and renamed "Other Specialized Support."</p> |
| | Response: | State agrees. Change made per request. |
| 127 | 4-1-9,
4-1-10,
4-1-11
& 4-1-
23 | <p>"Hazardous Waste Operations Chemical Operator,"
 "Hazardous Waste Operations Technician," and
 "Radioactive Solid Waste Operations Technician"
 combined into one general job description for "Waste
 Operations Technician/Chemical Operator."</p> |
| | Response: | State agrees. Change made per request. |
| 128 | 4-1-12,
4-1-13,
4-1-16,
4-1-17
& 4-1-
22 | <p>"Hazardous Waste Operations Technician Foreman,"
 "Hazardous Waste Operations Chemical Operator
 Foreman," and "Solid Waste Storage Area Foreman"
 combined into one general job description for "Waste
 Operations Foreman."</p> |
| | Response: | State agrees. Change made per request. |
| 129 | 4-1-18 | <p>Deleted the job description for "Hazardous Waste
 Operations Sanitary/Industrial Foreman" since the job
 duties involve only sanitary/industrial waste and not RCRA
 hazardous waste.</p> |

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130	4-1-19	Response:	State agrees. Change made per request. "Laborer/Truck Driver" reformatted.
		Response:	State agrees. Change made per request. "Forklift Operators" reformatted.
131	4-1-20	Response:	State agrees. Change made per request.
		Appendix 4-2 - Training Content	
132	4-2-1	Response:	State agrees. Change made per request.
		<u>HAZWOPER</u> <u>Training for General</u> <u>Site workers</u>	Insert "24-Hour" before the word "HAZWOPER" training and delete the words "Basic" and "for General Site Workers" following "HAZWOPER" in the section title to better differentiate between the two types of "HAZWOPER" training available at ORNL. Delete "assume responsibility for" and insert "take part in" in the first sentence of this section. In the last sentence of this section, delete "sources of hazard information" and insert "hazard control measures" following "types of hazards"; delete "and" following "toxicology"; and insert "personal protective equipment, monitoring, and emergency preparedness and response." These changes are required to better describe this training. Insert "24-Hour" before and delete the word "Basic" after the word "HAZWOPER" in the first sentence of the section entitled "HAZWOPER Training for Managers/ Supervisors" to reflect the title of the referenced training.
133	4-2-2	Response:	State agrees. Change made per request.
		<u>HAZWOPER Annual</u> <u>Refresher</u>	Delete the words "waste area" and replace with "site" before "control" in the last sentence to better describe topics of this training.
		Response:	State agrees. Change made per request.

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134		Attachment 5: CONTINGENCY PLAN	Modifications were made throughout the Contingency Plan to include only those units covered by this permit. All references throughout the draft permit to "Section G" have been changed to "Section 5." Unit drawing numbers have been revised.
		Response:	State agrees. Change made per request.
135	5-1	5-1 GENERAL INFORMATION - DESCRIPTION OF SITE AND ENVIRONS	Replace "K-25 Site" with "East Tennessee Technology Park (ETTP)" in the last sentence of the first paragraph in section 5-1 to reflect the recent K-25 Site name change.
		Response:	State agrees. Change made per request.
136	5-2		All unit drawings have been moved to a new Appendix 5-2 to make it easier to read the text.
			Replace "32" with "34" before "hazardous waste" in the second sentence to reflect the total number of TSD units at ORNL; replace "Each of those units" with "The TRU/Class III/IV units are listed in Table 5-1 and" before "described in the following paragraphs" in the third sentence in the first paragraph in section 5-1a; and delete the remainder of the paragraph.
			Delete the second paragraph in section 5-1a.
			Replace "Table G-1" with "Table 5-1" in the first sentence and insert "Unit drawings are found in Appendix 5-2" as the second sentence in section 5-1b.
		Response:	State agrees. Change made per request.

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137	5-3	Table 5-1 "Units Included in the Oak Ridge National Laboratory Part A Permit Application for management of Hazardous and Mixed Wastes"	<p>Delete all units not covered by this draft permit from Table 5-1.</p> <p>Insert "TRU and Class III/IV" before "Units" in the title of Table 5-1.</p> <p>Correct the name of Unit 7574 to Nuclear Fuel Services, Inc. (NFS) TRU Storage Facility.</p> <p>Response: State agrees. Change made per request.</p>
138	5-4 through 5-9		<p>Delete sections for Buildings 7507, 7652, 7507W, 7653, 7654, 7822, 7860 and drawings for these units since they are not covered by this draft permit.</p> <p>Renummer remaining figures.</p> <p>Response: State agrees. Change made per request.</p>
139	5-14		<p>Delete section for Building 7667 and unit drawing since it is not covered by this draft permit.</p> <p>Response: State agrees. Change made per request.</p>
140	5-19		<p>Delete sections for Buildings 7651 and 7834 and drawings for these units since they are not covered by this draft permit.</p> <p>Modify dimensions of Unit 7824 to "50 ft by 150 ft."</p> <p>Response: State agrees. Change made per request.</p>
141	5-24		<p>Delete sections for Hillcut Test Facility, Portable Sampling/Handling Units 1 and 2, and SWSA 5 North, Trench 27, 7802N, and drawings for these units since they are not covered by this draft permit.</p> <p>Response: State agrees. Change made per request.</p>

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142	5-29		Delete sections for Buildings 7830A, 7555, 7822A, 7659B and drawings for these units since they are not covered by this draft permit. Editorial comments were made in section for Building 7883 to reflect the unit status of already constructed.
		Response:	State agrees. Change made per request.
143	5-35		Delete section for Building 7668 and drawing for this unit since it is not covered by this draft permit. Editorial comments were made in section for Building 7572 to reflect the unit status of already constructed.
		Response:	State agrees. Change made per request.
144	5-40		Delete section for Building 7669 and drawing for this unit since it is not covered by this draft permit.
		Response:	State agrees. Change made per request.
145	5-46		Insert complete ORNL telephone number as "(423) 574-6606. Editorial changes have been made throughout the remainder of the draft permit to correct the title of the Oak Ridge Emergency Operations Center (OREOC).
		Response:	State agrees. Change made per request.
146	5-58		Corrected title of Radiological Solid Waste Operations from "RSWOG" to "RSWO."
		Response:	State agrees. Change made per request.
147	5-61		Corrected title of Oak Ridge Emergency Operations Center (OREOC). Specific information on location and staffing has been inserted.
		Response:	State agrees. Change made per request.
148	5-64		Corrected title of Technical Support Center.
		Response:	State agrees. Change made per request.

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149 5-65

New information has been inserted on the "DOE-ORO Emergency Response Organization (ERO)." Delete section on "Reactors Director" since this function is included in the section on "Technical Support Center."

Response:

State agrees. Change made per request.

150 5-66

New information has been added on the "Technical Support Center" and outdated information has been deleted. Delete section on "Department of Energy Emergency Organizational Structure" since this function is included in the section on "DOE-ORO Emergency Response Organization."

Response:

State agrees. Change made per request.

151 5-69

Change "HP" to "RP" to more accurately reflect the function of the Office of Radiation Protection.

Response:

State agrees. Change made per request.

152 5-76

5-6a; 5-6b

Delete reference to map since maps are not included in the draft permit. Modify specific emergency equipment included in emergency vehicles or facilities. Delete section on "Spill Response Trailer" since this equipment has been moved to other emergency facilities.

Response:

State agrees. Change made per request.

153 5-77

5-6c

Delete "overpacks" and "5-gal buckets" from the list of equipment in Building 7666.

Response:

State agrees. Change made per request.

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154	5-78	5-6c; 5-7	<p>Since Appendix 5-2 was added for the unit drawings, change previous "Appendix 5-2" to "Appendix 5-3," which is an example of the equipment on board the pumper trucks at ORNL.</p> <p>Delete references to Appendices 5-3, "Examples of Mutual Assistance Agreements" and 5-4, Examples of Mailing Lists," since these appendices are not included in the draft permit.</p>
		Response:	State agrees. Change made per request.
155	5-80	5-8	Update alarm signals used at ORNL.
		Response:	State agrees. Change made per request.
156		Appendix 5-1: Summary of Emergency Response Equipment	Delete units not covered by this permit.
		Response:	State agrees. Change made per request.
157			Insert a new Appendix 5-2 for unit drawings.
		Response:	State agrees. Change made per request.
158		Appendix 5-2: Summary of Equipment on Pumper Trucks	Change to Appendix 5-3.
		Response:	State agrees. Change made per request.
		Attachment 6: CLOSURE PLAN	

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159 6-1

Replace "proposing" with "using" after "ORNL is"; delete "be covered" after "this unit" in the first sentence; and insert the following sentence as the last sentence of footnote 1 to better define the function of the WEAFF.

"The WEAFF is not used for long-term storage of mixed waste; it is only used for staging of mixed wastes associated with characterization and verification activities."
 State agrees. Change made per request.

Response:

160 6-2

Insert "units" after "Class III/IV" in the first sentence on the page for clarity.

Insert "units" after "Class III/IV" and insert "the" before "WEAFF" in the first sentence of the third paragraph on the page for clarity.

Replace "Section I" with "Attachment 6" in the footnote to reflect the correct reference.

Renumber the footnote.

Response:

161 6-3

6-1b and 6-1c

State agrees. Change made per request.

Replace "Attachment 6-1a" with "Section 6-1a" in the last sentence of the second paragraph in section 6-1b; and replace "Attachment 6-1e" with "Section 6-1e" in the last sentence in section 6-1c.

Response:

162 6-4

Table 6-1 "Maximum waste inventory"

State agrees. Change made per request.

Replace "880" with "5,500" in the second column for Building 7824 and insert the following as footnote 1 to better define the function of the WEAFF.

"1 Building 7824 is not used for long-term storage of mixed waste; it is only used for storage of mixed wastes associated with characterization and verification activities."

See General Comments, Number 7, for more information.

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		Response:	State agrees. Change made per request.
163	6-12		Renumber the footnote.
		Response:	State agrees. Change made per request.
164	6-14		Delete section 6-1e(2) containing requirements for the closure of "disposal units" since there are no "disposal units" covered by this draft permit.
			Renumber section 6-1e(3) to 6-1e(2) since section 6-1e(2) has been deleted.
			Replace "Attachment 6-1e(1)" with "Section 6-1e(1)" in the second paragraph in under <u>Closure of Containers</u> to reflect the correct reference.
			Delete section 6-1e(11) containing requirements for the closure of "containment buildings" since there are no "containment buildings" covered by this draft permit.
		Response:	State agrees. Change made per request.
165	6-15		Delete sections 6-3b through 6-3e since they are not required for the clean closure of the units covered by this draft permit.
		Response:	State agrees. Change made per request.
		Attachment 7: CONTAINER MANAGEMENT	
166	7-1		Replace "request is hereby made" with "TDEC accepts pre-existing engineering drawings"; and delete "for the Commissioner to allow submission of the required engineering drawings" and "necessity of" in the third sentence; and replace "This allowance is requested for the following reasons:" with "because" in the fourth sentence of second paragraph and combine the fourth and fifth sentences into one sentence since these pre-existing drawings have already been accepted by TDEC.

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		Response:	State agrees. Change made per request.
167	7-2		Replace "ORNL hereby requests a waiver" with "TDEC approves ORNL's requested waiver"; replace "in" with "for" following "container storage areas"; and insert "for:" after the TN Rule reference in the first sentence under <u>RH-TRU Units</u> . (See General Comments, Number 2.)
			Delete "Namely, waivers are requested for:" following the first sentence under <u>RH-TRU Units</u> for clarity.
		Response:	State agrees. Change made per request.
168	7-3	Table 7-1 "Storage capacities for TRU and Class III/IV storage units"	Delete "(proposed)" following "7572" in the "Building number" column to reflect the status of Building 7572 as already constructed.
			For Building 7824, change the maximum area to "235" and the maximum volume to "5,500" in Table 7-1.
			Insert the following as footnote number 5 after "5,500" in the "Maximum volume" column for Building 7824 to better define the function of the WEAFF.
			"5 Unit is not used for long-term waste storage; it is used only for staging associated with characterization."
			Delete "(proposed)" following "7883" in the "Building number" column to reflect the status of Building 7883 as already constructed.
		Response:	State agrees. Change made per request.
169	7-4		Replace "ORNL hereby requests a waiver" with "TDEC approves ORNL's requested waiver" at the beginning of the first sentence under <u>Class III/IV</u> . (See General Comments, Number 2.)
		Response:	State agrees. Change made per request.

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170 7-6

Insert the following paragraph as the second paragraph under WEAF (Building 7824) to better reflect the function of the WEAF.

"The WEAF is not used for the long-term storage of mixed waste; it is only used for short-term storage of mixed wastes associated with WAC verification and waste characterization. When not in use for mixed waste characterization and/or verification, the WEAF will be controlled by WO staff; mixed waste residues will not be present."

Insert "(i.e., seepage and/or condensate)" following "accumulated liquids" in the third sentence under Building 7855 for clarity.

Response:

171 7-8

State agrees. Change made per request.

Replace "Attachment 3-2" with "Attachment 3" at the top of the page to reflect the correct reference.

Delete "Figs. 7-1-1 through 7-1-5" in the last sentence of the second paragraph since figure numbers will change with the deletion of some of the drawings. (See Specific Comments, Number 189.)

Delete "(under construction)" for the title of the section to reflect the status of Building 7883 as already constructed.

Insert "(i.e., seepage and/or condensate)" following "accumulated liquids" in the fifth sentence under Buildings 7883...and 7884 (proposed) for clarity.

Delete "Figs. 7-1-6 through 7-1-11" in the last sentence of the first paragraph under Buildings 7883...and 7884 (proposed) since figure numbers will change with the deletion of some of the drawings. (See Specific Comments, Number 189.)

Replace "Section F-2" with "Section 7-2" in the third sentence of the second paragraph under Buildings 7883...and 7884 (proposed) to reflect the correct reference.

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172 7-9

Response:

State agrees. Change made per request.

Delete "Fig. 7-1-8" and the parentheses around "Appendix 7-1" in the second complete sentence since figure number will change with the deletion of some of the drawings. (See Specific Comments, Number 189.)

Delete "Figs. 7-1-12 through 7-1-16" in the last sentence of the first paragraph under Buildings 7823 and 7844 since figure numbers will change with the deletion of some of the drawings. (See Specific Comments, Number 189.)

Delete "Figs. 7-1-17 through 7-1-24" in the fifth sentence since figure numbers will change with the deletion of some of the drawings and delete "Figs. 7-2-1 and 7-2-2 in" in the last sentence of the first paragraph under Buildings 7572, 7574, 7576, 7577, 7580, 7878, and 7879.

Response:

State agrees. Change made per request.

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173 7-10

Delete "Figs. 7-1-25 through 7-1-30" in the last sentence of the first paragraph (continued from the previous page) under Building 7578 (proposed) since figure numbers will change with the deletion of some of the drawings. (See Specific Comments, Number 189.)

Delete "Figs. 7-1-32 through 7-1-34" at the end of the paragraph under Building 7579 (proposed) since figure numbers will change with the deletion of some of the drawings. (See Specific Comments, Number 189.)

Insert "containing liquids" following "mixed waste" in the first sentence under Building 7824 for clarity.

Delete "Figs. 7-1-35 through 7-1-39" at the end of the paragraph under Building 7824 since figure numbers will change with the deletion of some of the drawings. (See Specific Comments, Number 189.)

Replace "A waiver was requested" with "TDEC approves ORNL's requested waiver" in the first sentence under "RH-TRU and Class III/IV Units." (See General Comments, Number 2.)

Insert "low-activity" before "LLW" in the fourth sentence under "RH-TRU and Class III/IV Units" for clarity.

Replace "Attachment 7" with "Attachment 3" in the last sentence under "RH-TRU and Class III/IV Units" to reflect the correct reference.

Response:

State agrees. Change made per request.

174 7-11

Replace "Attachment 7" with "Attachment 3" in the last sentence of the first paragraph (continued from the previous page) under "CH-TRU Units and the WEA" to reflect the correct reference.

Replace "Table D-2" with "Table 7-2" in the second sentence of the second paragraph under "CH-TRU Units and the WEA" to reflect the correct reference.

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		Response:	State agrees. Change made per request.
175	7-12	Table 7-2 "Maximum operating and secondary containment capacities for the CH-TRU units and the WEAFF"	<p>For Building 7824, change the maximum operating capacity from "880" to "5,500"; the secondary containment capacity from "248" to "1,550"; and the secondary containment as a percentage of maximum operating capacity from "28%" to "35%" in Table 7-2. (See General Comments, Number 8.)</p> <p>Insert the following as footnote number 3 following "5,500" in the second column for Building 7824 to better define the functions of the WEAFF.</p> <p>--3 Unit is not used for long-term storage of mixed waste; it is only used for staging of mixed wastes associated with characterization and verification."</p> <p>Renumber the footnotes.</p>
		Response:	State agrees. Change made per request.
176	7-13		<p>Insert ", moisture condensate and/or groundwater seepage" after "the bays" at the end of the first sentence and insert "in sufficient volume for sampling and analysis requirements" after "external sumps" in the second sentence of the first paragraph under "RH-TRU Units" for clarity.</p> <p>Replace "as soon as possible after their discovery" with "once sufficient volume is present to pump (excess of 6 inches)" in the second sentence to better define requirements for analyzing accumulated liquids, and replace "Section F-2" with "Attachment 3" in the third sentence of the second paragraph under "RH-TRU Units" to reflect the correct reference.</p>
		Response:	State disagrees. Liquid present in the sumps must be characterized even if not in sufficient quantities for testing. Liquid must also be removed as soon as possible from sumps. The words "moisture . . ." have been added to the first sentence. Section numbering has been changed.

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177 7-14

Replace "Attachment 5-4" with "Attachment 5" in the third sentence, and replace "Section F-2" with "Attachment 3" in the last sentence of the first complete paragraph on the page to reflect the correct reference.

Replace "Table 1-1 in Attachment 1-1, 'Chemical and Physical Analyses'" with "Table 1-1 in Attachment 1, 'Waste codes for RCRA wastes stored in the RH-TRU, CH-TRU, and Class III/IV units'" in the fifth sentence of the paragraph under RH-TRU Units to reflect the correct reference.

Replace "Attachment 7-1a" with "Section 7-1a" in the third sentence of the paragraph under CH-TRU Units to reflect the correct reference.

Replace "Some" with "Most" at the beginning of the first sentence of the paragraph under WEAF for clarity.

Response:

State agrees. Change made per request.

178 7-15

Delete "Figs. 7-1-1 through 7-1-5" in the first sentence under Building 7855 since figure numbers will change with the deletion of some of the drawings. (See Specific Comments, Number 189.)

Replace "Attachment 3-2" with "Attachment 3" to reflect the correct reference.

Response:

State agrees. Change made per request.

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179 7-16

Delete "(under construction)" from the title of the section to reflect the status of Building 7883 as already constructed.

Delete "Figs. 7-1-6 through 7-1-11" in the last sentence under Buildings 7883 ... and 7884 (proposed) since figure numbers will change with the deletion of some of the drawings. (See Specific Comments, Number 189.)

Replace "Section F-2" with "Attachment 3" in the third sentence of the second paragraph under Buildings 7883 ... and 7884 (proposed) to reflect the correct reference.

Response:

State agrees. Change made per request.

180 7-17

Replace "Facilities" with "Units" in the section title.

Replace "Attachment 7-1a" with "Section 7-1a" in the last sentence of the paragraph under Building 7578 (proposed) to reflect the correct reference.

Replace "ORNL hereby requests a waiver" with "TDEC approves ORNL's requested waiver" in the first sentence under 7-1c Container Management. (See General Comments, Number 2.)

Response:

State agrees. Change made per request.

181 7-18

Replace "Figs. D-2 and D-3" with "Figs. 7-2 and 7-3" in the second sentence of the paragraph under Container Information to reflect the correct reference.

Delete "(see Section B-4 for additional details)" at the end of the first sentence since this reference location has not been included in the draft permit, and replace "Section H" with "Attachment 4" in the second sentence of the paragraph under Movement of Containers to reflect the correct reference.

Response:

State agrees. Change made per request.

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182 7-22

Replace "Attachment 5-5i" with "Attachment 5" at the end of the last sentence of the first complete paragraph on the page to reflect the correct reference.

Replace "the Radioactive Solid Waste Operations Group (RSWOG)" with "Waste Operations (WO)" in the fourth sentence of the paragraph under Management Practices.

Response:

State agrees. Change made per request.

183 7-24

Replace "Section F-2" with "Attachment 3" at the end of the first sentence of the first complete paragraph on the page to reflect the correct reference.

Delete "(see discussion in Section J, Recordkeeping)" from the end of the third paragraph on the page since the reference location has not been included in the draft permit.

Renumber the footnotes.

Response:

State agrees. Change made per request.

184 7-25

Replace "Sections G-5i and F-2b" with "Attachment 5" in the last sentence of the third paragraph under Container Inspections to reflect the correct reference.

Replace "RSWOG" with "WO" in the sixth sentence of the first paragraph under Management Practices.

Response:

State agrees. Change made per request.

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185 7-26

Replace "RSWOG" with "WO" and replace "Section C-2e" with "Attachment 1" in the second complete sentence of the first paragraph (continued from the previous page) to reflect the correct reference.

Replace "Table D-1" with "Table 7-1" at the end of the second complete paragraph on the page to reflect the correct reference.

Delete "(see discussion in Section J, Recordkeeping)" from the end of the last paragraph on the page since the reference location has not been included in the draft permit.

Response:

State agrees. Change made per request.

186 7-27

Replace "Section H" with "Attachment 4" to reflect the correct reference and delete "(see Section B-4 for additional transportation details)" in the first sentence under Movement of Containers since the reference location has not been included in the draft permit.

Response:

State agrees. Change made per request.

187 7-28

Replace "the RSWOG" with "WO" in the fourth and last sentences of the paragraph under Management Practices.

Delete "(see discussion in Section J, Recordkeeping)" from the end of the third paragraph under Management Practices since the reference location has not been included in the draft permit.

Replace "Waste Characteristics" with "Waste Analysis Plan" at the end of the first paragraph under RH-TRU and Class III/IV Units to reflect the correct title of the reference.

Response:

State agrees. Change made per request.

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188 7-29

Delete the following sentence from the end of the first paragraph under CH-TRU Units and WEAF since the reference location (Map 2) has not been included in the draft permit.

"See Map 2 in Appendix B-1 for the location of the CH-TRU units."

Replace "Section D" with "Attachment 7" in the heading for the reference section for consistency.

Response:

State agrees. Change made per request.

Appendix 7-1:
ENGINEERING
DRAWINGS

189 7-1-1
and 7-
1-2

Table 7-1-1 "Building
Drawings"

"Drawings is misspelled on the appendix title page.

All figure numbers have been changed from "D-..." to "7-..." for consistency.

Drawings have been renumbered to reflect the deletion of 14 drawings which are not essential to the permit.

Response:

State agrees. Change made per request.

Appendix 7-2:
Container Storage
Secondary
Containment
Calculations

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190 7-2-1

Replace "8.2079" with "8.2709" in lines 3, 5, 19, and 21 to correct a typographical error.

Replace "40 ft x 4 ft" with "36 ft x 2 ft" to reflect the correct dimensions of the sump in Building 7879; and replace "240 ft³" with "108 ft³" in line 12 to correct the calculation.

Replace "1,176 ft³" with "1,044 ft³" in lines 13 and 15 to correct the calculation.

Replace "8,796 gal" with "7,809 gal" in line 15 and replace "7,548 gal" with "6,561 gal" in line 17 to correct the calculation.

Replace "Appendix D-3" with "Figures 7-2-1 and 7-2-2" in footnote "a" to reflect the correct reference.

Response:

State agrees. Change made per request.

191 7-2-2

Replace "8.2079" with "8.2709" in lines 10 and 12 to correct a typographical error.

Replace "Appendix D-3" with "Figures 7-2-1 and 7-2-2" in footnote "a" to reflect the correct reference.

Response:

State agrees. Change made per request.

192 7-2-3

Replace "8.2079" with "8.2709" in lines 2 and 4 to correct a typographical error.

Replace "Appendix D-3" with "Figures 7-2-1 and 7-2-2" in footnote "a" to reflect the correct reference.

Response:

State agrees. Change made per request.

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193 7-2-4

Replace "8.2079" with "8.2709" in lines 3 and 5 to correct a typographical error.

Replace "4" with "25" in line 7 and "248" with "1,500" in line 8 to reflect the increased staging capacity of the WEA. (See General Comments, Number 8.)

Replace "Appendix D-3" with "Figures 7-2-1 and 7-2-2" in footnote "a" to reflect the correct reference.

Response:

State agrees. Change made per request.

Comments From the Public:

Comment: "Low-level" waste should be isolated by technology that results in zero-release of radioactivity over the hazardous life and one that minimizes inadvertent intrusion. Whatever substances are used must be rigorously characterized regarding stability, impermeability and resistance to the radiation levels and chemicals that will be encountered.

Response: Radiation from mixed wastes are regulated by the US Department of Energy. The hazardous waste permit rules require that hazardous and mixed waste storage, treatment, and disposal facilities meet security requirements that prevent the unknowing entry, and minimize the possibility for the unauthorized entry, of persons or livestock onto the active portion of the facility. Hazardous waste Generators are required to make a hazardous waste determination under Tennessee Rule 1200-1-11-.03(1)(b). Under Tennessee Rule 1200-1-11-.07(2)(d) the owner or operator who treats, stores, or disposes of any hazardous wastes must obtain a detailed chemical and physical analysis of a representative sample of the wastes which at a minimum, contain all the information which must be known to treat, store, or dispose of the waste.

Comment: All permits should be written to provide for changes or revocation at any time, and should be re-evaluated at least every two years.

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Response: Under Tennessee Rule 1200-1-11-.07(8)(c)1, permits shall be effective for a fixed term not exceed ten (10) years or the expected operating life of new facilities or the expected remaining life of existing facilities, whichever is less. Under 1200-1-11-.07(8)(c)4 land disposal facility permits shall be reviewed by the Commissioner five years after the date of permit issuance or reissuance and shall be modified as necessary. Permits can be modified or revoked for cause under Tennessee Rule 1200-1-11-.07(9)(c) at any time.

Comment: Established quality control procedures should be used. All monitoring data should be conveniently available to the public and the press from facility operators and the Tennessee Department of Environment and Conservation, Division of Solid Waste Management.

Response: Permittees are required to meet the requirements of Tennessee Rule 1200-1-11 which establish quality control procedures. Availability of monitoring data from the facility operators is at the discretion of the facility. Monitoring data from the Tennessee Department of Environment and Conservation, Division of Solid Waste Management is available for review from 8:00 a.m. to 4:30 p.m. at the central office from Monday through Friday.

Comment: Regulatory controls should require operator certification and an operations and maintenance plan. Inspection to determine if the plan is being followed should be both announced and unannounced and should cover all shifts at the X-10 facility. Permit should provide for the establishment of a citizen's oversight committee which can designate and supervise its own inspector. This person shall be trained and employed at facility expense and should inspect the facility on at least a weekly basis, independent of state inspections.

Response: Tennessee rules do not require operator certification. Operation and maintenance of the facility are regulated by the permit which has security, inspection, waste analysis, recordkeeping, reporting, training, closure, post-closure, solid waste management unit release, preparedness and prevention, contingency and emergency procedures, manifest, and unit specific requirements. Inspections by the Division can be both announced and unannounced and occur at reasonable times. Tennessee statutes provide for a Solid Waste Board to promulgate regulation and listen to permit appeals and citizen complaints, but does not provide for a citizen's oversight committee which can designate and supervise its own inspector.

Comment: Part of the facility's cost of doing business should include the preparation of environmental and public health risk assessments, permit fees, monitoring, closure, insurance

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and post-closure contingency funds. A special tax should be imposed on the facility to compensate Oak Ridge for bearing the health. This compensation should be available for improving community emergency response capabilities, additional monitoring, health testing, health care, transportation safety, and other costs attributable to the X-10 facility.

Response: Annual and permitting fees are regulated under Tennessee Rule 1200-1-11-.08. Closure, insurance, and post-closure contingency funds are regulated under 1200-1-11-.06(7) and (8). Under 1200-1-11-.06(8)e States and the federal government are exempt from financial requirements. Certain hazardous waste units such as boilers, incinerators, and open burning/detonation will require preparation of environmental and public health risk assessments by the permittee. Any monitoring required under the permit will be required to be at the facility's expense. Any special tax for compensation would have to be enacted by the state legislature.

Comment: I am a little curious about what is included in these units. I know next 10 years or so DOE is going to solidify the wastes in Milton Valley tanks. Is this contemplated to be stored in these buildings.

Response: According to DOE, They may be stored in these building for a short time while in preparation for shipment off-site. It may not be stored in these building for long time.

COMMENT: One commenter expressed concern about the disposal of radioactive waste in barrels in a land facility and the possible consequences on future generations.

RESPONSE: This is outside the realm of this permitting action. This permit deals with the storage of waste in containers in buildings. Land disposal of a mixed hazardous waste is prohibited unless the disposal facility meets all the regulatory design criteria and Land Disposal Restriction (LDR) requirements.

